Stress in firefighters: situations, reactions and interactions

Thesis

STRESS IN FIREFIGHTERS : SITUATIONS, REACTIONS AND INTERACTIONS.

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STRESS IN FIREFIGHTERS:
SITUATIONS, REACTIONS, AND INTERACTIONS

ABSTRACT

A series of studies were carried out to determine how experience and training in firefighters affected their reactions to situations they encountered at work.

The first three studies used quantitative and qualitative techniques to identify those situations which firefighters found to be significant to them in terms of varying stressfulness. One of these studies sampled firefighters who attended the Manchester Air Disaster.

The final two studies used the situations identified by the initial studies and extended the methodology of Payne, Fineman & Jackson (1982) in the development of a measure of work anxiety within a paradigm of interaction between situations and individual reactions.

Evidence for the interactionist position was found in both studies although subject's reactions to situations seemed to be situationally driven. Strength of reactions to situations did reduce over time due to training, experience, occupational group homogeneity and the learning of coping strategies.

As a result of these studies an extended model of the interactionist position was proposed as well as some suggestions for future research.

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'Upon this text my mind went weaving across its dusty space, amid the sunbeam thoughts and their dancing motes of idea'.

T.E. Lawrence.

CONTENTS

CHAPTER 1

1. INTRODUCTION

The study of stress in occupational settings has come to the fore over the past two decades. A large number of these studies have focussed attention on causal factors of stress and anxiety leading to an outcome of dysfunction (e.g. Broadbent, 1985; Cooper, 1986; Cooper & Marshall, 1976; French, Caplan & Van Harrison, 1982; Frese, 1985; Frese & Zapf, 1988; Kagan & Levi, 1974; Kearns, 1986; Parkes, 1982). More recently, emphasis has been placed on the outcome of occupationally specific events. Such concepts as post traumatic stress disorder, post disaster stress and post incident stress have been used to explain the stress and anxiety experienced by specific individuals and occupational groups when they encounter or are involved in traumatic situations or events (e.g. Cox, 1987; Davidson & Baum, 1986; Duckworth, 1987; Durham, McCammon & Allison, 1985; Taylor & Frazer, 1982).

The emphasis in these cases has again been on dysfunction as the outcome (sometimes presumed by some to be inevitable) but little research has been carried out on individuals or occupational groups who experience stressful or anxiety provoking situations and cope, i.e. no dysfunction is experienced or apparent. Appley & Trumbull (1986) noted that the focus on the 'stressed' has led us to overlook 'healthy' individuals. These 'healthy' individuals are presumably the ones who cope, even though

they do experience stress and anxiety.

This thesis is a study of stress in an occupational group which regularly faces non-routine life-threatening events - The Fire Service. The author is a serving officer in the fire service and the idea for this thesis emerged from his general observations of firefighters at work. The author's interest focussed around Appley & Trumbull's (1986) comments that there seemed to be little research carried out on those individuals who appeared to cope with occupational situations without dysfunction. Firefighters seemed to be amongst this group of individuals and it appeared likely that they must feel anxious when faced with stressful situations at work. The author's interest extended to determining the times when firefighters felt anxious, what anxiety was experienced, and how this anxiety and experience of stressful situations affected them over time. Concomitant with these was the question of how firefighters coped and what effects experience and training had in helping them to cope with non-routine and life-threatening events.

This chapter is designed to identify major issues and themes in stress research, particularly in occupational settings. Later chapters will expand on these issues and themes. At this juncture it is appropriate that definitions of stress and anxiety are proposed.

1.1 Definition of Stress and Anxiety

In stress research, there have been almost as many

attempts to define the concept of stress as there have been researchers. There have also been many attempts to define anxiety and at times the two terms have been used interchangeably to describe the same function.

Ruff & Korchin (1967) defined stress as a process occuring when an organism is forced into strenuous efforts to maintain essential functions at a required level. They further outlined the process of the organism modifying its behaviour as a result of the stress experienced using the concept of adaptation as a compensatory response in order for the organism to continue to work under the 'load'. The model for this type of definition of stress is mechanistic in its terms i.e. input-output-adaptation. These types of mechanistic models and definitions led to the selection of specific conditions to produce stress and some form of measure to indicate its presence and subsequently to measure the change in behaviour. The type of experiments that ensued from this model took no account of individual differences.

Surprisingly, as far back as the early 1950's, researchers (Basowitz, Persky, Korchin & Grinker, 1955; Lazarus, Deese & Osler, 1952; Muller, 1953) recognised that there may be many different kinds of stress and that stress could not be generated by a standard set of conditions but was dependent upon the individual's expectations and demands. Stress was therefore an **individual response** to internal and external processes

rather than an imposition upon the individual. Cofer & Appley (1964) defined stress as 'the state of an organism where he perceives that his wellbeing (or integrity) is endangered and that he must divert all his energies to its protection'. What emerged therefore, was an acknowledgement that an individual was determining when stress would occur or not. Such acknowledgement suggested that stress was in effect a response state and that the 'trigger' for experiencing stress would be dependent upon appraisal, perception and interpretation by the individual.

Cox (1978) provided an interactionist definition of stress which took account of an individual's perception and included an intermediate stage as well as a final stage within the definition. He stated that stress 'can only be sensibly defined as a perceptive phenomenon arising from a comparison between the demand on the person and his ability to cope. An imbalance in this mechanism, when coping is important gives rise to the experience of stress and to stress response. The latter represents attempts at coping with sources of stress'. This statement provides a good working definition of stress as it contains the essential concepts i.e. perception, comparison, demand, coping and stress response. It also recognises the experiential nature of stress.

Chalmers (1981) goes further than Cox by stating that 'the experience of stress is the balance or imbalance

resulting from the interaction of four components :- internal needs and values, external environmental demands and constraints, personal resources or capabilities and external environmental supplies and supports'. Chalmers introduced the concept of external demands by recognising environmental influences in the experiencing of stress. He concluded that an environment - organism transaction approach would offer a realistic setting for stress research and theory.

Appley and Trumbull (1986) following Lazarus (1966) and Leventhal's (1970) approach also stated that 'stress was now recognised as involving the totality of an individuals transactions with his or her environment; and more importantly, such transactions must be understood both in their context and over time'. Gradually, more emphasis has been placed on the transaction and interaction effects between an individual and the environment. The context can be defined as the transaction interaction in the specific situation or situations within the environment. Included in this is what the individual brings to the situation and not just the demands of the situation per se.

Taking account of the above, a working definition of stress must include a multitude of factors and it is suggested that such a definition incorporates Cox's definition within a situational context which recognises temporal characteristics and the ability of the individual

to respond positively. Situations themselves can be classified by using any of the synonomous terms:- stressor, stressful, stress inducing and anxiety provoking.

Anxiety can be generically defined as the responses or reactions that are elicited from an individual to a stressful event or situation. The term anxiety has been used by Speilberger (1975) to denote firstly a state which is transitory in nature and idiosyncratic to certain situations which impinge on the individual. Secondly, it is seen as a trait which refers to relatively stable predispositions which do not vary across situations. Thirdly, it is the outcome of a process which includes a complex interaction of cognitive, affective and behavioural characteristics which is 'triggered' by some stressful event.

Sarason & Sarason (1981) provided a workable definition of anxiety as well as distinguishing between it and stress. They commented that whereas stress was a call to action caused by appraising the properties of situations and personal dispositions, anxiety was a self-preoccupying response to perceived danger and inability to handle a challenge or unfinished business satisfactorily. An anxious person will therefore not necessarily react to the call for action but may nevertheless respond in some way. Duckworth (1986) defined anxiety as a future-oriented emotion which a person experiences when

anticipating the possible occurrence of an undesirable event.

Anxiety can therefore be seen as a precursor to a perceived stressful event or situation which provides the individual with an opportunity to respond in some way.

1.2 The Situation in Anxiety Research

Situational sources of anxiety are a product of individual uncertainty and unfamiliarity with a situation. Spielberger (1975) called attention to situations and situational stress as a variable in research on anxiety. Magnusson (1978) believed that the environment influenced individual behaviour but the environment itself is mediated by the actual situations.

There have been many classifications and distinctions made of both the physical and subjective aspects of an environment or situation (Ekehammer, 1974; Endler & Magnusson, 1976 (a), 1976 (b); Fesbach, 1978; Magnusson, 1978; Pervin, 1978). The main difference between environment and situation is that the environment can be construed as the background which is general and constant whereas situations are the sudden altering backgrounds which are fleeting and transient. Some researchers (Ekehammer, 1984; Endler & Magnusson, 1976 (a), 1976 (b); Magnusson, 1971, 1974) have distinguished two major components for investigating situations:-

i) Situation perception

ii) Situation reaction

These researchers believe that the perception of a situation by an individual is an essential factor in determining the behaviour elicited. Endler (1981) sees an important issue as being whether or not the situation can be defined independently of the perceiver and touches on the subject of the interaction between situations and individuals. Frederikson (1972) and Rotter (1954) have both suggested that a taxonomy of situations defined by the similarity of responses to them could be formed and there have been many inventories designed within this Situation-Response paradigm.

1.3 Work Anxiety and Occupational Stress

The Situation-Response paradigm has lent itself to studies within a work/occupational setting where situations are fairly predictable although some occupations experience unpredictable events e.g. police, firefighters, emergency workers etc. Most of the studies of stress in occupational settings have been directed towards identifying relationships between one or several factors in the environment and some adverse response or dysfunction. Bremmer, Sorbom & Wallius (1985) felt that this approach tended to identify every factor as a potential stressor in some situations whilst making it difficult to generalise between contexts. They therefore favoured a person-perception-reaction-interaction model (transactional model) in their study of teacher stress.

However, most of the studies into stress in

occupational settings have emphasised their effects on health and dysfunction as the outcome. Some studies (Long & Voges, 1987; Motowildo, Manning & Packard, 1986; Payne, Fineman & Jackson, 1982) have assumed within their models of occupational stress that there would be specific events that were more likely to be more stressful than others, that they would be occupationally specific and that they need to be empirically identified for different jobs.

Any model of anxiety at work which attempts to measure that anxiety must therefore be contextually based and be meaningful and relevant to the respondents. Payne et al (1982) stated that generalised measures of traits and global situations have had limited success in predicting work behaviour and that work based measures must improve significantly those predictions.

1.4 The Multidimensionality of Anxiety and the Interactionist Model

Spielberger (1975) has suggested that anxiety is formed by two factors i.e. state and trait. Both of these factors were thought to be unidimensional but a number of studies (Endler & Okada, 1975; Endler, Hunt, Mc V & Rosenstein, 1962; Endler & Shedletsky, 1973) found that trait anxiety was in fact multidimensional i.e. individual differences in trait anxiety can occur for the same situations and, conversely, an individual may tend to be anxious in one situation but not another. Some of the factors which give trait anxiety this multidimensionality

include cognitive anxiety, social evaluation anxiety, interpersonal/ego threat anxiety etc. (Endler, 1980). However, Lazzerini, Cox & Mackay (1979) suggested that there was sufficient evidence to maintain a concept of general trait anxiety independent of situational influences although they did find evidence of multidimensional factors.

Endler & Hunt (1969) proposed the interactionist model of anxiety which not only took account of an individual's personality traits and circumstances alone, but also considered the individual's characteristic ways of behaving in different classes of situations. In other words, the model acknowledged the multidimensionality of anxiety and also recognised its situational specificity. This multidimensional interaction model of anxiety uses as its rationale the findings of the S.R. Inventory of Anxiousness (Endler, Hunt & Rosenstein, 1962) which assumes that the extent or the degree to which a trait is expressed can be influenced by a number of factors i.e. the types and proportions of situations where specific responses are exhibited, the type intensity duration and number of responses exhibited as well as the provocativeness of the various situations in arousing specific responses.

Within an occupational setting as discussed above, the classes of situations may be defined through the taxonomy of situations created by the occupational group

themselves. The interaction effect between the person, the situation and reaction within an occupational group and setting makes possible sensitive measures of work anxiety. This is because the reactions are to situations which are relevant and meaningful to the individual.

1.5 Mastery of Anxiety and Coping

Epstein (1967) summarised a number of studies and presented a theory of the mastery of anxiety. The assumption of this theory was that exposure to threat develops firstly a broadening, steepening and heightening of a generalisation gradient of anxiety, and secondly the development of an inhibition gradient which becomes increasingly steeper than the anxiety gradient. These two processes account for anxiety providing an increasingly efficient warning system producing early warning signals which reduce levels of arousal when success is experienced in facing a source of stress.

The term mastery can be thought of as synonomous with other terms like adaptation, coping, competency, skill and ability etc. These terms indicate that there is a process that an individual undergoes when faced with situations whereby a successful outcome occurs. Levine, Weinberg & Ursin (1978) provide an adequate definition of coping :- 'an individual is presumed to be coping if his behaviour consists of responses to environmental factors that help him master the situation'. Cohen & Lazarus (1979) add a broader definition of coping as 'efforts both action-

oriented and intrapsychic to manage (that is master, tolerate, reduce, minimise) environmental and internal demands and conflicts among them, which tax or exceed a persons resources'.

When mastery, coping, competency etc. occurs then individuals who possess well developed skills and abilities to meet situations and environmental demands are less likely to suffer dysfunction. Mechanic (1970) noted that the adequacy of preparation is a major determinant of what situations are experienced as stressful.

1.6 Coping in Occupational Settings

Within an occupational setting the acquisition of mastery, coping strategies, competency etc. may be due to a number of factors, two of which may be paramount. These are training and experience. Motowildo et al (1986), in their study of occupational stress amongst nurses, concluded that stress reduction could be achieved in part by training programmes that modified reactions to stressful events so that individuals would be less likely to react strongly when those events occurred. Training, which includes the acquisition of specific skills and abilities must therefore be an important feature in making an individual respond to a situation without feeling over-challenged or uncomfortable.

Intuitively, experiencing a situation must more often than not lead to the learning of coping strategies which reduce anxiety and lead to eventual mastery of those

situations. When mastery occurs within an occupational setting this can be termed professional competency. Ruff & Korchin (1967) found that the most striking feature of their study of the Mercury Astronauts was the effectiveness of their mastery in terms of their responses based on past experience and professional competence. It is suggested here that mastery is an important feature to study within an occupational setting as most individuals spend most of their life dealing with occupationally specific situations.

1.7 Summary

Section 1.1 outlines the definitions and differences of the concepts of stress and anxiety. Both concepts can be expressed cognitively as a perceived experience or feeling that the informant can report on.

Stress involves an interaction of the person with the environment with anxiety being a precursor to the event that is perceived as stressful. The demand upon the person provides an opportunity for the individual to meet that demand with some form of response. The response may be to use the opportunity by reacting positively to it or be constrained by it. The balance of the cognitive appraisal is in the perceived consequence of successfully coping with the situation compared to leaving it unaltered. In other words, stress exists where there is an imbalance between perceived subjective demand and perceived response capability.

McGrath (1983) outlined a number of themes from the general stress literature, three of which are important to this thesis. The first deals with cognitive appraisal which uses emotional, physiological and behavioural response indicators of subjectively experienced stress. Stress experienced is contingent upon the persons perception and interpretation of the objective or external stress situation. The second theme encompasses experience. Familiarity and exposure to situations, training and practical reactions to master situations both alter the levels of subjectively felt stress to a given situation. They also modify the anxiety felt towards that situation and consequently the reaction to it. Within this theme stress can be seen as part of the property of the situation. The third theme is reinforcement. Failures and successes alter the levels of subjectively experienced stress to a situation. Stress can therefore be conceptualised subjectively as an experience, a feeling or an internal state, and objectively as a property of a situation.

Problems arise in experiments that are designed to measure stress due to the following main reasons:-

i) single stressor or simple measures of stress that are used to make the results too specific.

ii) convergent results of separate measures are interpreted as a generalisation model of

stress. Non-convergent results may disprove the generalisation theory and be interpreted as evidence of alternative measures or as different reaction patterning.

iii) different individuals may react differently to the same stressful situation, whilst the same individuals may react differently to two different stressful situations. These confound the search for general relationships between the situations and observed reactions to them.

iv) the use of different situations and conditions in stress research means that there can be little comparability of results Also, the subjectivity of a person's perception of a stressful situation is so unique that the size of the reaction of the individual may vary due to perception, experience, training, coping strategies used etc. In addition, the situation may be perceived similarly by a number of individuals who react in the same way but the size of the reactions may vary between individuals.

When anxiety is experienced through the onset of a stressful situation, and the individual reacts successfully to the situation, then coping occurs. As

outlined above, coping is synonomous with the terms adaptation, mastery and competency. The process of coping involves both overt and covert behavioural strategies which are aimed towards:-

i) preventing or removing the stress
ii) controlling or suppressing the stress
iii) preventing the consequences of stress
iv) enabling stress to be used effectively or positively

Coping behaviour may occur at any time before, during or after the stressful situation is experienced. In this way it can be conceptualised as a temporal factor.

Mechanic (1970) stated that it was equally important to study those individuals who did not feel challenged or who experienced little stress and anxiety as it was to study those who were 'anxious' and 'stressed'. He further added that in noting the various reactions to the same situations, there was opportunity to identify those aspects of approaches and behavioural functions that led to crisis and those that made the situation only an occasion for further progress and mastery.

It is clear that cognitive, pyschological and emotional reactions are complex processes between the individual and the situation which determine behaviour and the eventual outcome. These factors undoubtedly contribute in their own right to the determination of behaviour and its variance. Increasingly, more emphasis

has been placed on the interactions between the individual and the situation. Here, the concept of anxiety becomes important as it can be used specifically as a personality variable and as a complex response. Neither of these variables may provide adequate information on their own unless we have information about the situations, provocative or otherwise, that they interact with.

Experiments and studies into stress and anxiety in laboratory settings create an artificiality because of the very nature of the research. Limitations also apply to studies in a naturalistic setting where situations are real and dynamic. Events, reactions and behaviour to those situations therefore result in real consequences. Methodological and definitional arguments are also problematical in the measurement of stress and anxiety and as a result, planning for research within the subject area can be difficult.

However, it is suggested (McGrath, 1983) that effective research can be achieved by utilising such factors as:-

i) multiple measures of subjective stress and anxiety

ii) situations that vary along a continuum of stressfulness rather than just high and low stressor situations and which can be compared across themselves as well as across and within subject's reactions to them.

iii) situations that are meaningful to the respondents. In other words, proper realism is used in naturalistic settings.

This thesis will use the definitions of stress, anxiety and coping as discussed above. The concept of stress will be taken to mean the subjective experience, feelings and internal state of an individual as he or she interacts with the environment and where demands are made upon the individual in order to cope. Stress will also be used as objective reality to mean the property of a situation that is perceived by an individual as one which demands a response. These situations may also be labelled stressors, stressful, stress-inducing, amxiety provoking.

Anxiety will be used within this thesis to describe the mental and physical arousal of an individual in anticipation of a stressor. It is therefore a precursor to the event and is manifested in the reactions and responses elicited by the individual to the stressor, and these in turn are the determinants of the behavioural characteristics of an individual when interacting with the stressor. Objectively, a situation which is perceived as stressful and provokes a reaction can be termed anxiety provoking. Anxiety may therefore be seen as either person driven (A-trait), situationally driven (A-state) or as a multidimensional concept that is interactionally driven.

Coping, adaptation, mastery and competence are terms that will be used to describe the success of an individual

in dealing with or overcoming a situation that has been perceived as stressful of is anxiety provoking.

1.8 Outline of the Research Topic

The scope of the thesis research topic will cover stress and anxiety in an occupational setting. The occupation chosen is that of a firefighter as this is one which covers a wide range of situations from the mundane and routine to ones which involve personal threat and danger. There have been a number of studies carried out in 'related' occupations, notably the police (e.g. Cox, 1987; Davidson, 1979; Davidson & Veno, 1980; Duckworth, 1986) but to date, there has been little research and investigation into stress in firefighters.

Using the definitions outlined above in section 1.7, experienced firefighters will firstly be asked to report on those situations which they find stressful as well as those situations which help them to cope and feel relaxed. The data gathering in the first part of the thesis will be by a semi-structured interview technique.

The list of occupational situations produced from the qualitative data gathering methodology of the semi-structured interview technique will then be confirmed using an quantitative method of analysis by mood categories. A list of situations should emerge which are occupationally specific, having been gathered in a naturalistic setting. They should therefore have high face validity and realism. This will add a valid

dimension to the research that follows.

The next two studies will be set within the interactionist paradigm. Situations from the previous studies will be used and respondents will be asked to report on these situations using a multidimensional measure of anxiety covering both psychological and emotional reactions. The first of these studies will use experienced firefighters in a cross sectional study. It is hoped that the data produced will highlight firefighter's reactions to situations not only as individuals but as an occupational group. In this way similarities and differences of individuals and the group can be studied. The interactionist position seems appropriate as it is not only important to know about someone's personal traits or circumstances alone, but also we need to know how they behave in specific situations or classes of situations. Multivariate analyses of the results including multidimensional scaling will be used to reveal structures and patterns within the data which will test the interactionist position.

The second study will follow recruit firefighters through the first twelve months of their career in a longitudinally designed study. This study will use the same data gathering methodology as the previous study to further test the interactionist position. It should also show how experience gained may alter an individual's reactions to situations over time. A comparative analysis

will also be made between the result of experienced firefighters and the recruits. Both of these analyses may provide insights into how and when experience is gained, and coping, competency and mastery is achieved within an occupational group and setting.

1.9 Understanding the Occupational Setting of Firefighters

Prior to the first study, Chapter 2 is devoted to outlining the background to the fire service in Gt. Britain. An understanding of the occupational setting together with the 'working life' of a firefighter is important in order to fit the thesis into a contextual framework.

A glossary of terms is also provided in the appendices (Appendix 10).

CHAPTER 2

2. SETTING THE SCENE : BACKGROUND TO THE FIRE SERVICE

2.1 Introduction

All of the United Kingdom is covered by a public fire service. Each local government is empowered by the Fire Services Act 1947 to make provision for fire fighting purposes and to secure the services of a fire brigade and to equip it to meet efficiently all normal demands upon it. The local authority is therefore designated under the Act as the fire authority for that area.

Although fire authorities deal with the day-to-day running and administration of their brigade, a degree of control is exercised by the Home Secretary and the Secretary of State for Scotland.

Each fire authority must maintain an establishment scheme showing the number of officers and other ranks, fire stations and the number and types of fire appliances that they consider necessary to cover its area.

Every fire authority's area is categorised in terms of its fire risk according to a laid down set of criteria which divide the risk categories into A, B, C or D. Formally, this is known as the standard of fire cover. In general terms, A and B risk areas are the cities and larger towns, C risk areas are the smaller towns and D risk covers the rural areas. The risk category under which an area falls determines the number of pumping appliances that need to be sent to any fire call in that

area. This is also known as the 'first attendance' and determines the approximate times for that first attendance to arrive at any point within the area. The above can be summarised as follows:-

Risk Category	Number of Pumps for first Attendance	Approx. time limits for attendance in minutes		
		1st Pump	2nd Pump	3rd Pump
A	3	5	5	8
B	2	5	8	-
C	1	8-10	-	-
D	1	20	-	-
High Risk	Pre-determined Attendance			

As can be seen from the table, there is also a high risk category. This is reserved for specific risks, e.g. International Airports, large Petro-chemical plants, etc., where the risk is such that a large first attendance is necessary. In these cases a special attendance (pre-determined attendance) is arranged.

The speed and weight of first attack which is determined by the risk categorisation process also determines the number of fire stations needed in the area, the number of firefighters and the duty systems which they need to work.

2.2 Fire Service Establishment and Rank Structure

There are 45000 firefighters in Great Britain. Of this number approximately 28000 are full time personnel who work a fixed duty system covering 42 hours per week either on a rota basis with a cycle of 2 days, 2 nights and 4 days off, or on a normal work day cycle giving call out cover at night from their home address. For those firefighters working a rota, there are 4 shifts to cover the whole duty system. These shifts are termed watches and designated by the colours red, white, blue and green. The remainder of firefighters are termed 'Retained' which means that they are employed in other full time occupations but work for the fire service on a part-time basis, i.e. they are on call from their work or from their homes during the night.

This mixture of wholetime and part-time personnel gives a cost effective method of providing the standards of fire cover mentioned above where wholetime personnel are available 24 hours a day for the speed needed to respond within the time limits laid down for A, B and C risk areas. The retained service therefore covers exclusively the more rural and remote parts of the country (D risk areas).

The fire service is an hierarchical organisation with the following structure:-

Chief Fire Officer	(CFO)
Deputy Chief Fire Officer	(DCFO)

Assistant Chief Fire Officer	(ACFO)
Senior Divisional Officer	(SDO)
Divisional Officer Grades I, II and III	(DO)
Assistant Divisional Officer	(ADO)
Station Officer	(Stn. O)
Sub Officer	(Sub. O)
Leading Firefighter	(L/Ff)
Firefighter	(F/f)

Every person who enters the fire service joins at the rank of firefighter. There is no two tier entry or accelerated promotion. The entry requirements are passés in a battery of ability range tests, medical examination and physical tests.

For promotion to the ranks of leading firefighter, sub-officer and station officer, a firefighter must first pass the statutory promotion examinations for that respective rank. Notwithstanding having passed the relevant examinations and completion of the minimum length of service, promotion is on merit through interviews and this continues through the higher officer ranks.

2.3 Structure of a Brigade

The overall management and control of a brigade is the responsibility of the Chief Fire Officer.

The Chief Officer, senior and staff officers of a brigade work from a central headquarters whilst the operational functions of the brigade will be split into divisions normally based on geographical features as well

as size of population of towns and cities within the brigade and also the number of fire stations.

Each division has a number of officers whose role is supervisory as well as specialist (fire prevention, training etc.) and is headed by a Divisional Commander whose rank is normally Divisional Officer or in the larger brigades, Senior Divisional Officer. Within the division will be a number of fire stations. Each wholetime fire station has a Station Commander and on a four watch shift system each watch will have a Watch Commander.

Retained stations have an officer in charge, normally of Sub Officer rank.

A common structure together with designated functions and responsibility of various officers is set out below:-

Fire Service Headquarters	Function
Chief Fire Officer	Overall management
Deputy Chief Fire Officer	control of Brigade
Assistant Chief Fire Officer(s)	Specialist references for different depts.
Various ranks for each Department	
Divisions	
Divisional Commanders	Overall management
No. dependent on divisions in Brigade	control of part of the Brigade
Rank dependent on size of Division from SDO in large Brigades to DO 111 in small Brigades	(Division)

Specialised Depts

e.g. Staff Training,
Fire Prevention
All ranks
Supervisory Officers Ranks include
Divisional Officers and
Assistant Divisional Officers

Part of management structure of Division

Fire Station

Station Commanders rank
dependent upon number of
personnel in Station.
Assistant Divisional Officer
Station Officer

Management of a fire Station

Fire Station

4 Watch System

Officer in charge of a watch
either Station Officer or
Sub Officer
Watch contains Leading firefighters
and Firefighters

2.4 Training

All recruit firefighters who join the wholetime service undergo 3 months of specialised training to ensure that they are confident and competent in the basic skills of the fire service. The greatest emphasis is on practical ability and the handling and use of all equipment including the wearing of breathing apparatus

(BA). They also study theoretical aspects which cover diverse subjects from hydraulics and chemistry to the construction of buildings. At the end of this 3 month recruit training, firefighters are posted to an operational watch at a fire station where they will serve a 2 year probationary period. During this time their skills are increased by day to day training. Whilst attending incidents, their practical experience and competency are built up. They are also watched closely by their officers to ensure that they integrate closely with their colleagues on the watch. Part of the ethos of the fire service is team work and social acceptance. Integration is important when the team often functions in its operational role under stress in adverse, dangerous and miserable conditions.

Training for officers of all ranks from leading firefighter upwards is carried out centrally at the Fire Service College, Moreton-in-Marsh. Courses held there vary from 1 week to 14 weeks and are structured to ensure a progressive system of training through the ranks.

2.5 'Tools of the Trade'

The basic hardware that the fire service uses is the Water Tender Ladder (fire appliance). This vehicle carries a crew of between 4 and 6 and is equipped with a variety of equipment in order to deal with the day to day incidents that the fire service attends. A fixed pump driven by the road engine delivers up to 4500 litres of

water per minute and the appliance normally carries 2250 litres of water in a tank for a 'first strike attack'. Other equipment on board a water tender ladder includes a 13.5 metre ladder and a variety of other smaller ladders, crash rescue equipment, breaking in gear (axes, bolt croppers, sledge hammers, saws, etc.), hose and branch pipes, ropes (lines), breathing apparatus and a miscellany of any other gear that may be needed from time to time.

Other specialist vehicles are kept fully crewed and are used at specific incidents. Below is a list of the more common specialist vehicles and their uses:-

i) Emergency Tender (E.T.) - Carries a large amount of rescue equipment and breathing apparatus. Used to deal mainly with accidents where people are trapped and need to be extricated by powerful and sophisticated equipment.

ii) Turntable Ladder (T.T.L.)- A 30 metre hydraulically operated ladder that can reach any height up to 30 metres. This is used to provide a rescue staircase when persons are trapped in buildings and also as an aerial monitor to deliver water onto a fire.

iii) Hydraulic Platform (H.P.)- Similar function to the T.T.L. but operates by a cage attached to a number of hydraulically operated booms

which can reach up to 26 metres.

There are also a number of other specialist vehicles which are not as common as those mentioned above. The type of specialist vehicle and the equipment it carries will be dependent upon the risk area that it covers and also the part that it plays in the strategic make up of the particular brigade that has purchased it.

2.6 Fire Station Routine

Life on a fire station with a 4 watch system is split into 2 shifts. The day shift consists of 9 hours, normally from 0900 hours to 1800 hours. The night shift covers 1800 hours to 0900 hours the following morning. Each watch works a shift pattern of 2 days, 2 nights and 4 rota days and this enables the fire station and its fire appliances to be continually crewed 24 hours a day, 365 days per year.

There are other duty systems in existence for wholetime firefighters, e.g. day manning and nucleus manning, but the preponderence is the 4 watch system.

The number of firefighters on each watch will vary according to the number of fire appliances on a station. A small one pump station will normally consist of two junior officers and five firefighters whereas the larger stations may have watch strengths of 20+ including officers. Each station also has an officer-in-charge who effectively commands and manages the station and its 4 watches. He also provides operational cover for incidents

within the station area and sometimes beyond.

The officers who work the 4 watch duty system are designated as 'rider officers' (because they ride the fire appliances) whilst the more senior fire officers including station commanders and other specialist officers who provide fire cover are conditioned to a flexible duty system based on a rota system giving 40 'office' or 'desk' hours and 32 'standby' hours making up a 72 hour week.

The day duty on a 4 watch station commences with a parade, check of all appliances, equipment and other vehicles. Following this is a training (drill) session which can be highly repetitive in order to practice skills to gain habituation in the use of basic equipment. This is necessary because there is a requirement to be able to operate equipment 'automatically' without great thought or error.

Other training sessions are included which test firefighters on their general ability to adapt themselves and their equipment to unusual situations. There are also lecture sessions which are designed to teach firefighters the theoretical side of fire service subjects and give them an understanding of the technical 'facts and figures' side of the equipment they carry and use.

Following the training sessions, the day may be divided into various activities such as hydrant inspections, fire prevention inspections, visits to premises and risks within the station area in order to

familiarise the firefighters with the layout of such risks in case they attend a fire or other incident there.

The night duty again commences with a parade, appliance and equipment check and a training session. The rest of the evening is then normally taken up with maintenance of equipment, followed by a 'stand-down' period when the firefighters rest. Before going off duty, the night crew cleans and tidies the station and appliances ready for the change of watch.

2.7 The Operational Role of the Fire Service

Firefighters in the United Kingdom attend upwards of 700,000 emergency calls per year. These calls are divided into the following categories:-

i) Fires

ii) False Alarms (malicious and good intent)

iii) Special Service Calls

Fires account for 55% of the total calls. Within this category, the size of fires range from rubbish in the open air, grass fires (these are termed 'known small fires') through to the very large fires requiring massive amounts of manpower and machinery to extinguish them.

Within the fire category, approximately 1000 people die in fire every year. Most of these deaths occur amongst the very young or old of the community and happen, in the main, in normal domestic dwelling houses.

The false alarm category can be divided into two separate areas, i.e. malicious and good intent and amount

to 30% of total calls. The malicious false alarm is the 999 telephone call received by the fire service and is commonly termed a 'hoax'. This type of call ties up manpower and resources unnecessarily and they therefore cannot be available for any real emergencies that the fire service may receive at the same time.

The second type of false alarm is the 'good intent' call where either automatic fire detection systems have been triggered for a number of reasons but not by fire and also genuine calls from a member of the public who perceives visual or aural cues of a fire mistakenly.

The third category of call is the special service. These are incidents which are not fires but where there is a need for a rapid response to an emergency situation. Such incidents include pumping operations, chemical spillages, accidents, persons trapped in lifts and machinery. The list is endless as is the variety of incidents attended.

Whenever a call is received to an incident, either fire or special service, where people are reported to be trapped then the incident is designated as a 'persons reported'. Naturally, this type of incident has the effect of making the firefighters 'pull out all the stops'.

This means that firefighters are not only working under the 'usual' severe physical conditions but also are subjected to higher levels of psychological stress and

anxiety than would normaly be encountered at emergency incidents.

Where firefighters attend large fires that cannot be sufficiently dealt with by the first attendance and therefore a greater amount of manpower and equipment will be required, facilities exist for the officer-in-charge to request additional appliances via radio communications with the Brigade Control. These requests are called 'make ups' and this term refers to the style and wording of the request message sent back, e.g. 'make pumps 5'.

Emergency calls from the public or from fire alarm systems are received or routed into a brigade's control room. This is a specialised branch of the service and control room operators are responsible for the receipt of these calls and the despatch and mobilisation of fire appliances to an incident. Communications between brigade control and fire stations is by telephone land lines, but once fire appliances are mobile, then the communication link is via radio. Most fire brigades these days use computer aided mobilising which speeds up the response of the fire service to incidents.

CHAPTER 3

3. STRESS, ANXIETY AND COPING IN FIREFIGHTERS: A PRELIMINARY STUDY

3.1 Introduction

Firefighters in Great Britain attend upwards of 700000 emergency calls per year. These calls are received in a random pattern and it is therefore necessary to have resources available 24 hours a day throughout the year to meet the demand. Firefighters cannot anticipate or predict when a call will occur and they must therefore hold themselves ready to respond to emergency calls at any time during their period of duty. During each shift or tour of duty a firefighter is engaged in many work-related activities, eg. training, fire prevention inspections, hydrant inspections, equipment maintenance etc. and during any one of these activities they may be required to go from a state of comparative relaxation to extreme activation within a matter of seconds. During this time a firefighter will be transported to the scene of an emergency and whilst en-route will be engaged in getting 'dressed' into firefighting gear, donning breathing apparatus or other equipment. They will also be thinking of a number of things such as :-

i) The quickest route to the incident,

ii) The type of property involved,

iii) The dangers that may be encountered at the incident,

iv) The available water supplies,

v) Whether persons may be trapped or injured and their possible whereabouts in the building,

vi) The situation that is likely to confront them on arrival.

Once they have arrived they will be told to work in unfamiliar surroundings in extremes of conditions for lengthy periods and may experience discomfort through the dangers they face or the scenes they are called upon to witness and deal with. The stress that firefighters experience in such situations does not overtly appear to affect their performance as they seem to cope with these emergencies effectively.

In stress research there have been as many attempts to define the concept of stress as there have been researchers. A working definition that would take account of the firefighter's definition and perception of the situation was needed for the present study. The working definition of stress provided by Cox (1978) and outlined in Chapter 1 seemed pertinent to these circumstances. The stress response that Cox mentions may also manifest itself in anxiety and can include physiological arousal, experience of emotions such as fear, avoidance and the impairment of thinking and action (Fenz & Epstein, 1962).

Coping is an important aspect of the toleration of stress without disruptive anxiety. Baade, Halse,

Stenhammer, Ellertson, Johnson, Vollman & Ursin (1978), in a study of coping in volunteer parachute trainees in the Norwegian Army, hypothesised that coping was a function of what the person learns about his/her status in a stressful situation. Also, they found that other variables seemed to play their part in the coping process i.e. social signals from peers and instructors and personality factors. Lazarus, Averill & Opton (1974) saw coping as a problem solving exercise to overcome the physiological and emotional outcomes of experiencing stress as well as taking into account the situations that an individual faced where the outcome could not be predicted and where the limits of skills available to the individual were approached.

Levine, Weinberg & Ursin (1978) pointed out a different approach to the 'problem solving' of Lazarus et al. They suggested the concept of 'cognitive defence mechanisms' which, if effective, would reduce arousal by being dependent upon the person's subjective appraisal and perception of the situation. Coping could thus be seen as a mastery of stress by an individual who must apply specific strategies according to the perceived situation. This mastery, it can be postulated, is borne out of experience.

How far experience affects fear and anxiety was studied by Fenz & Epstein (1967) in research on both novice and experienced sports parachutists. Using

thematic apperception tests (T.A.T.) Galvanic Skin Response (G.S.R.) heart and breathing rates and self report techniques they found that whilst novice parachutists showed a gradual build up of fear on the day of the jump with the monotonic gradient reaching a peak at the time of jump, experienced parachutists developed inverted V shaped curves with the peak of fear and anxiety being displaced backwards in time. This envelope of time around a stressful event acts as a useful framework for the present study.

The fear and anxiety decreased progressively the nearer the experienced parachutists got to the time for jumping. Levine et al (1978) argued that these findings were not so much relevant to the study of the development of coping, but more to the determination of which individuals would become experienced and that some form of self-selection mechanism might be at work. However, Janis (1971) commented that although Fenz & Epstein's (1962) results could not be regarded as unequivocal, the findings were consistent with other sports parachutist groups as well as 'airline pilots, scuba divers, professional skiers, mountain guides and others who face repeated risks whilst undergoing training for highly dangerous occupations' (Janis, 1971). Halse, Blix, Ellerston & Ursin's (1978) study of self rating of fear in Norwegian Army parachute trainees showed a phasic response for each jump from a mock parachute tower, but there was a gradual

decrease in the levels of self-reported fear as the training progressed, producing falling tonic gradients as a function of time. Experience in this case produced a gradual reduction in subjective fear.

The reduction of fear as a function of increasing experience may also be dependent upon whether the event is signalled or not. An analogy of an expected or unexpected stressful event may be made with signalled or unsignalled shock respectively.

A number of researchers studied the effect of signalled and unsignalled shock on fear and aversiveness reduction (Averill 1973; Badia, Culbertson & Harsh 1974; Lockard 1963). Although there is evidence to suggest that ' without a signal, fear is chronic and, therefore more aversive' (Levine, et al 1978), Furedy (1975) concluded that perceived unpleasantness of a noxious stimulus did not seem to be dependent on whether the event was signalled or not. The preparatory response hypothesis (Perkins, 1968) and the safety signal hypothesis (Seligman, 1968) have both been postulated to explain why signalling may reduce the aversiveness of a noxious event. In a review of these hypotheses, Wilkie (1981) summarised by recognising that although signalling may reduce the overall aversiveness of exposure to noxious stimuli, this reduction must be assessed by measurement of the individual's adjustment or response to the situation. Such an adjustment may be produced by experience. Another

variable which has an effect on reaction to a noxious event is the individual's expectancy of the intensity of the anxious event. Epstein & Clark (1978) studied this effect concluding that immediate impact varies directly with expectancy. These findings may be relevant within the present study as firefighters may receive an unsignalled shock when they 'turnout' to an emergency.

Most of the studies cited above have concentrated on the effect of training and experience on coping and/or mastery in situations when the subjects have been able to predict by signals the time of onset of the anxiety provoking event. Even when the event is not signalled, the experiments have been carried out in a laboratory environment rather than a naturalistic setting. It can be argued that firefighters in their working environment have a unique role in many ways and any study of their experience of stressful events and coping behaviour may not fall neatly within any of the paradigms reviewed above. However, these paradigms may form a useful frame of reference.

In conjunction with this frame of reference, a number of studies (Long & Voges, 1987; Motowildo, Packard & Manning, 1986; Payne, Fineman & Jackson,1982) have proposed a model of occupational stress that fits usefully into the frame of reference. The model assumes that:-

i) There would be specific events more likely to cause stress than others,

ii) The events were occupationally specific,

iii) They therefore needed empirically identifying for different jobs.

Using a 45 event scale identified through dicussions and questionnaires with groups of nurses, Motowildo et al (1986) concluded that the events were caused jointly by conditions of the job setting and the personal characteristics of individuals who reacted in ways that precipitated them.

The present study used the assumptions of the model and the frame of reference in a 'first-cut' analysis to highlight those events in a firefighters work that are perceived as stressful and therefore anxiety provoking and the coping mechanisms and strategies they adopt in an attempt to 'fix' them into that frame of reference.

The present study used a semi-structured interview technique based on questions which divided the firefighters' area of work into categories where it was thought that they may experience most stress and anxiety.

The division of the questionnaire into time categories also took into account McGrath's (1970) observation that coping behaviour may take place before, during or after the occurrence of a stressful event. The questionnaire was designed in this way to attempt firstly to identify these times, circumstances, situations and events which firefighters felt were stressful or anxiety provoking, and secondly, to indicate any strategies and

mechanisms which helped them to cope.

3.2 Method

3.2.1 The Questionnaire

Forty-one questions were designed and placed into six categories. Four categories related directly to different areas of a firefighter's work where it was thought that they would perceive as stressful and find anxiety provoking. A further category related to questions about activities following the arrival home after a shift had ended.

The first category gathered information on personal details.

The categories were:-

i) Personal Details

ii) Training

iii) Fires

iv) Other Calls (special service calls, i.e. calls that are emergencies but not connected with fires, e.g. road traffic accidents

v) General questions of experience of fear/anxiety/stress at incidents and back at the station

vi) Arrival home after a shift

The questionnaire was administered using a semi-structured interview technique. Appendix 1 shows an example of the questionnaire.

3.2.2 Subjects

The study involved eighteen male subjects (all of firefighter rank) from one station, spread across three watches (shift groups). Each watch worked a shift pattern of two days, two nights and four rota days. The day shift started at 9.00 a.m. and ended at 6.00 p.m. and the night shift started at 6.00 p.m. and ended at 9.00 a.m. the following morning.

The fire service employs its own criteria of an experienced firefighter, i.e. a person with four years in the service who has undergone a number of tests of competence, and the S's were drawn using these criteria apart from one who had three years service. The average length of service of all the S's was 9.5 years, with a range of service from 3 to 19 years. The age spread of S's was from 21 - 37 years.

3.2.3 The Setting

The fire station that the S's served on was within a large Metropolitan County. There were two pumping appliances and one foam tender at the station. The area which the station covered included large residential housing estates (both private and council), high rise buildings and old and modern industrial premises. Also within the area that it covered was a busy international airport and the station area was bounded by motorways and main arterial roads leading to the city centre.
Because of these various 'risks' the station attended a

wide variety of 'typical' emergency calls that reflected the types of calls the fire service attends in general. The approximate number of calls attended by this station was 2500 per year.

3.2.4 Procedure

Before the interviews began, each watch was given brief details about the purpose of the study, that it had no connections with any official fire service study and that the interviewer, although an officer in the fire service, was not carrying out any official function as a member of the fire service. Also, within the interview, no rank differences would be observed and the information would be treated in the strictest confidence.

Each S was then interviewed following the outline of the questionnaire and his comments noted. Because of the structure of the questionnaire and the informality of the interview, a number of issues were raised which were not covered by the questions and these, where the interviewer felt they were relevant to the study, were included in the questionnaire answers.

3.3 Results

A content analysis was carried out on all the interview transcripts and the results are set out below by the categories defined within the questionnaire.

3.3.1 Training

Table 3.1 shows that the majority of S's identified that the constant repetition involved in doing basic

TABLE 3.1 ASPECTS OF TRAINING Ss FOUND MOST OR LEAST USEFUL IN HELPING TO COPE WITH STRESS AT INCIDENTS

	ASPECT	NUMBER OF* RESPONSES
MOST USEFUL	working as a team gives confidence in crew makes everyone reliant on each other	16
	constant repetition and evaluation of drills gives confidence in equipment,helps coping by making actions automatic	14
	using realistic conditions	3
	off station training	2
LEAST USEFUL	repetitious drills boring	1
	repetition makes you overconfident	1

* some Ss responded to more than one category

training drills gave them confidence. It became 'second nature' to operate equipment without having to think about it. It also led to team confidence by working together and being reliant on other individuals to ensure a good all round team effort. All this, they believed, made it possible to operate 'automatically' at incidents, which meant that there was very little need to take up valuable time by having to think about a response with any item of equipment. On the question of whether simulated conditions in training put S's under stress, Table 3.2 shows that there was no real variation either way. Some of the reasons given for feeling anxious during training are set out in Table 3.3. Of particular interest is fear of making a mistake, either in front of peers or senior officers which featured in ten of the S's remarks, whereas only three S's thought that they did not feel anxious in training.

3.3.2 Fires

Table 3.4 shows that when attending fires, most S's indicated that they felt more anxious/stressful when going to the fire, with arrival at the fire being the second most anxious period, followed by getting the initial alarm. For drivers, the most stressful experience was going to the address that they did not know personally, with night driving being the second most stressful feature recorded. Drivers stated that they felt 'controlled excitement' with a number of strategies being adopted such

TABLE 3.2 Ss REACTIONS AS TO WHETHER SIMULATED CONDITIONS IN TRAINING ARE STRESSFUL

	number of responses
yes	6
no	6
in exceptional cases	4
where conditions are unfamiliar/ challenging	2

TABLE 3.3 Ss REASONS FOR FEELING ANXIOUS IN TRAINING

reason	number of responses
fear of making a mistake or fool of oneself	5
fear of letting colleagues down	2
senior officer supervision	5
carrying out some forms of specialised training e.g. breathing apparatus	3
do not feel stressed in training	3

TABLE 3.4 STAGES OF A FIRE CALL WHERE Ss FELT ANXIOUS

stages	number of responses *
initial alarm	5
en-route to the fire	9
arrival	6
working at the fire	1
after the fire	0
on return to station	0

* some Ss responded to more than one category

as concentrating on getting there, subconsciously calming themselves down and thinking about the route to an address. Only two S's felt that they were more aggressive than normal when driving.

Travelling as a member of the crew in the appliance en-route to an incident seemed to be an anxious period with S's and colleagues displaying various behaviours. S's were asked what they did during this period, Table 3.5 sets out S's responses to this.

All S's felt the greatest cause of stress was the fire in which people were still in the building, i.e. 'persons reported' fire.

Other stressful events at a fire which, according to S's made them anxious were:-

i) Fear of the unknown.

ii) Searching for a body.

iii) Peer pressure if the 'job' went wrong.

Upon arrival at the start of firefighting operations, S's thought their actions became 'automatic' and yet, from the analysis of the questionnaire, it appeared that they were clearly concentrating on the job in hand with such answers as:-

i) Looking out for dangers, being cautious and thinking about self preservation.

ii) Thinking where persons or fire may be situated.

iii) Thinking about what they had been taught in

TABLE 3.5 ACTIONS OF Ss WHILST RIDING AS A CREW MEMBER EN-ROUTE TO A FIRE

action	number of * responses
thinking about the address/type of property/risks in the building	4
thinking about the dangers that might be encountered	2
thinking about special actions needed/actions on arrival	11
start talking/getting noisy	5
sit quietly/try to relax	12
check gear constantly	4
ask for/pass information	6
worry about performance	3
do not think about the fire	1
think its a false alarm	1

* some Ss responded to more than one category

training and applying it.

iv) Keeping verbal contact with partners and passing information.

v) Thinking about whether they would find a body or not.

S's were asked directly how they thought they coped with the stress of a fire. Six stated that if they tried their best, then they were happy with their performance. Five stated that they were re-assured by the presence of their colleagues with seven stating that they tended to 'talk a lot' to their partner or colleague. Two stated that they felt excited whilst two others said that they tried to keep themselves relaxed.

Observations by S's on their colleagues behaviour at a fire revealed a variety of behaviours, the most prominent being:-

i) Agressiveness.

ii) Going quiet.

iii) Getting loud, noisy or talkative.

iv) Getting agitated/excited.

v) Some taking a 'step back' and weighing up the job, others getting in straight away.

S's were asked for their feelings and thoughts immediately after the fire and before the start of clearing up operations at the incident. Table 3.6 shows that a feeling of relief that it was all over was most prominent. Five S's felt pleased if the job had gone well

TABLE 3.6 Ss INDIVIDUAL FEELINGS AND THOUGHTS IMMEDIATELY AFTER THE FIRE

feelings/thoughts	number of responses *
feel relief/relaxed that its over	10
feel pleased if its gone well	5
think about any errors that I or others have made	5
think about it in my own mind	4
think whether I have have done enough	1
if something goes wrong-then feel I am to blame	1

* some Ss responded to more than one category

and it was clear that S's thought about their actions at the incident with especial emphasis on any mistakes they had made.

Table 3.7 shows that between the time that the fire had been extinguished and the start of clearing up, individuals stood around in a group or groups, talking and listening to individuals' experiences of that fire. Minor mistakes were pointed out or made mention of lightheartedly by peers but they had a pertinent significance. Part of this process was the humour which crept into these 'discussions'. After a 'working job' when S's returned to station, all equipment is cleaned, tested and 'made good'. There then follows a period of informal but intense discussion about the incident with more critical comments, lightheartedness, aggression, irritability and introspection. The discussion also includes talk about past experiences and how they relate to the incident they have just attended. Table 3.8 outlines the responses made by the S's to this stage of the fire. These 'discussions' also appertained to emergency special service calls that S's attended.

3.3.3 Special Service Calls

S's were asked if they thought that special service calls where life was in danger presented them with differing amounts of stress in comparison to fires. Fourteen S's thought that the amount of stress was greater. Table 3.9 shows the main reasons given for this

TABLE 3.7 COLLECTIVE ACTIONS BY CREWS IMMEDIATELY AFTER A FIRE WHEN NOT EMPLOYED IN CLEARING UP OPERATIONS

collective actions	number of* responses
stand around talking of individual experiences at the fire	15
minor mistakes are mentioned in the group and made light of	3
stand in a huddle laughing and joking and generally make light of experiences at the fire	4

*some Ss responded to more than one category

TABLE 3.8 ACTIONS OF Ss ON RETURN TO STATION AFTER SERVICING THEIR EQUIPMENT

actions	number of responses *
collectively talking about the "job" that weve just been to	14
engage in high spirited banter/ critcise mistakes	15
talk about past experiences and relate them to the "job" weve just had	6
show aggression/become irritable	11
think about own performance and go over it several times	5
talk yourself down from the "high" of the "job"	2

*some Ss responded to more than one action

TABLE 3.9 Ss REASONS FOR DIFERRING AMOUNTS OF ANXIETY EXPERIENCED BETWEEN SPECIAL SERVICE CALLS AND FIRES WHERE LIFE IS INVOLVED

	reason	responses*
more stressful	person you can see and hear is hurt	6
	frustration/helplessness as only one or two crew members can work	6
	knowing the person may die if you are not quick	3
	its hard to assess the incident correctly	2
	more skill and concentration needed	2
	other dangers eg. traffic	1
	unsure of what is required	1
less stressful	you can visibly see the incident	2
	less personal danger	1

* some Ss gave more than one reason

being that they were dealing with people who they could see and hear and who were probably injured. Because there is normally only room for one or two firefighters to work in such situations the rest of the crew can only stand and watch. This makes them feel helpless, frustrated and anxious. S's were asked how they reacted to these types of calls and also what they observed of their colleagues behaviour.

Table 3.10 shows that to try and cope with the feelings of helplessness, frustration and anxiety, they kept themselves busy by finding work to do, even if it was as mundane as sweeping glass off the roadway. If they could not busy themselves, they tended to congregate around the incident.

3.3.4 General Questions

When asked if they thought fear/anxiety subsided with experience, thirteen S's thought that it did. Three S's thought that experience helped them to keep calm whilst seven S's thought that the confidence in both themselves and their colleagues, built up by experience, reduced anxiety. Of the three S's who thought that fear did not subside with experience, two reported that they thought that it was necessary to keep them 'on their toes' and aware.

The gradient of fear curves for novice and experienced sports parachutists (Epstein & Fenz,1965) were shown to S's and they were asked to comment on where they

TABLE 3.10 GENERAL OBSERVATIONS BY Ss OF THEMSELVES AND COLLEAGUES AT SPECIAL CALLS WHERE LIFE IS IN DANGER

observations	number of responses*
keep busy	15
get frustrated	5
congregate around incident	3
think en-route that no one is trapped	2
show knowledge and skills	1
more talking than at a fire	1
no showing emotion as this may affect performance of others	1
everyone looks anxious	1

* some Ss gave more than one observation

thought firefighters displaced their fear to, bearing in mind that they did not know when an emergency call would come. Eight S's thought that it was displaced to after the fire with five stating that 'it was on return to station and you talked about it'. Four thought it was displaced on the station at times throughout the shift and three thought that it was 'released' at the time of the incident.

Table 3.11 indicates the responses of S's to the question of when they thought that fear/anxiety subsided after experiencing a stressful incident. The majority of S's felt that it tended to subside on return to the station. Three stated that it seemed to subside at the fire, three others between one and two hours after the incident and two thought that it was within half an hour after an incident. Two S's mentioned that in the case of an unusual incident, i.e. a dead child, then it could be prolonged until the next day before they felt that the anxiety had subsided and a further two S's thought that arrival home after a shift was the time when it seemed to subside.

Table 3.12 shows the results when S's were asked if they experienced any other conditions at work that were stressful. Half the S's said that they felt uneasy when senior officers closely supervised their performance and four S's stated that they felt no other conditions at work which made them feel anxious. Three S's harboured a fear

TABLE 3.11 Ss RESPONSES AS TO WHEN THEY THOUGHT THAT FEAR/ANXIETY SUBSIDED AFTER EXPERIENCING A STRESSFUL EVENT

response	number of * responses
at the incident	3
immediately after the incident	1
on return to station	10
approx. 30 minutes after incident	2
1-2 hours after incident	3
the day after for very stressful incidents eg. death of child	2
on arrival home after shift	2

*some Ss reponded to more than one category

TABLE 3.12 OTHER CONDITIONS AT WORK WHERE Ss FELT ANXIOUS

condition	number of responses
fear of senior officer supervising performance	9
fear of failure/letting colleagues down	3
oral examinations	2
no other conditions	4

of failure/letting their colleagues down. When asked how they 'let off steam' on the station, all S's said that they participated in activities, most of which could be classified as 'unofficial' such as 'taking the mickey', 'having a go' jokingly at someone on the watch, practical jokes and water fights.

3.3.5 Arrival Home After a Shift

When arriving home following a shift, nine S's stated that they felt irritable, some thinking that this was through tiredness with two S's stating that this irritability seemed worse when coming off night duty, especially if they had been busy.

Two S's said that their wives could tell how busy they had been by the degree of irritability that they displayed when they got home.

3.4 Discussion

The aim of this study was to try to identify those times, situations and circumstances which where stressful to firefighters whilst they were at work, as well as to give an indication of any mechanisms or strategies that they might adopt in order to help them cope.

Fire service training techniques are based on constant repetition in the form of drills covering all items of equipment that are carried on fire engines. Variety is introduced by changing the environment and situation in which the equipment is used and also by

changing the combination of equipment to be used. All this is backed up by lectures on technical aspects of equipment and procedures to be adopted at any given incident. An important aspect of this training is that all members of the watch train together as a team, combining on frequent occasions with other watch colleagues based at surrounding fire stations. The most important aspects of training for S's were the competence that was built up through confidence in their equipment and the team confidence that was engendered by working closely with their colleagues.

S's believed that the type and style of training they engaged in ensured that when called upon to use their equipment in an emergency they could do so 'automatically' so that they did not need to think deeply about a response in order to operate their equipment. This is borne out of S's statements that on arrival at an incident, they felt that they went into 'automatic' and yet it was also clear from their statements that they were concentrating on the job in hand with an emphasis on thinking about dangers and procedures as well as keeping close social contact with their colleagues or partner. Levine et al (1978) have drawn a distinction between habituation and coping:- 'Coping differs from habituation in that the stimuli that elicit the coping response continue to be threatening and aversive but the organism no longer responds to them; this is in contrast to the process of habituation where the

stimuli themselves are relatively neutral!'. It could be argued that training is a form of habituation with firefighters responding to fairly neutral cues and stimuli which may be challenging but not threatening. When faced with a true emergency, it may be that these habitual responses (automaticity) allows sufficient cognitive and physiological capacity to be directed towards employing coping strategies to deal with the situation, hence S's reports of concentrating on the job in hand, thinking of dangers, putting procedures into practice and maintaining close social contact.

Training can thus be seen as an important part of the build up of experience, eventually enabling the individual to cope with stressful situations and the anxiety that will be experienced. This process has been highlighted by the reductions in levels of fear and anxiety as a function of experience in training found by a number of researchers (Epstein & Fenz, 1962, 1965; Fenz, 1975; Fenz & Epstein, 1962, 1967; Halse et al, 1978). In all training situations, trainees perceive and anticipate that they will be anxious even when a particular stressor may not be signalled. It is likely that the onset of a training session acts as a signal producing strategies for what McGrath calls 'anticipatory coping' (1970).
This appears to be similar in effect to the preparatory response hypothesis of Perkins (1968) whilst once the training session is under way, trainees may revert to a

form of safety signal hypothesis (Seligman, 1968) to predict stress free periods within the training session. There is, therefore, an adjustment of response to the situation as a whole and to events within the situation.

What this all means in terms of a firefighter's training is not particularly clear but the repetitive nature of the training may be necessary in order to practice and perfect their basic coping skills and strategies. This enables them to be effective and competent in their adaptational responses when they face real emergencies. Adaptation is important as it provides 'a compensatory response which permits continued functioning in spite of the load (placed on the organism)' (Ruff & Korchin, 1967). It is presumed that part of this compensatory response is what S's describe as 'going into automatic' and combined with past experience and professional competence, the result can be similar to Mechanic's statement that '..... successful coping requires regularized adaptive responses that have become part of a persons coping repertoire, and these skills can be enacted without any elaborate awareness of the situation' (1970). The result is that coping occurs due to effective adaptation of the coping strategies in real situations.

When a call is received at a station, firefighters go from a state of comparative relaxation into a state of extreme activation. As they cannot predict when a call

will occur there is no anticipatory period so the station alarm could be construed as an unsignalled noxious event. However, only five S's rated the alarm as anxiety provoking. This falls in line with Furedy's (1975) findings that the perception of the unpleasantness of the noxious event is not dependent upon signalling. What is more likely is that the station alarm acts not as the noxious event per se, but rather as a signal to the noxious event i.e. the emergency incident to which that particular alarm relates. The anticipatory period is the time taken to travel to the incident. This is the time when S's felt most anxious and they attempted to preoccupy themselves with operational details or use conscious mechanisms to control or inhibit any anxiety they were experiencing. The planning ahead of what to do on arrival may in itself be an effective coping strategy. No S's stated that they experienced any severe or disabling anxiety, probably because of their competence and confidence built up through experience and training.

Although not falling strictly within the paradigm of preference for signalled shock, as firefighters have no choice, their reactions and behavioural responses through the time periods of an emergency call may be explained broadly by the two hypotheses described in the introduction, i.e. 1) the preparatory response hypothesis and 2) the safety signal hypothesis. It could be argued that both these work together and that whichever one is

being used is dependent upon temporal variables. When firefighters perceive the overall situation, ie. Alarm - Travel - Arrival - Working at the Incident, the time factors can be assumed by them with a fair degree of accuracy through experience. Here, then, the safety signal hypothesis can be presumed to be valid as firefighters can predict the shock free periods and engage in activities which reduce arousal and anxiety, eliciting some measure of relaxation. These activities are shown in Table 3.5 for the 'ride' to the incident and probably take account of the 'automatic' response, concentrating on procedures and plans, being cautious, and looking out for dangers whilst at the incident. However, because of the uncertainty of events and the dangers that may be present firefighters may be receiving signalled and unsignalled stimulii or experiencing noxious events during operations with very small time intervals between them. In these circumstances, firefighters may produce a preparatory response to these individual events within the whole situation.

After the incident firefighters are physically fatigued, there is a general feeling of elation, relief and relaxation, together, in most instances with a pre-occupation by the individual with his/her own actions, errors and overall performance. This pre-occupation may be due to anxiety acting after the event. The general feeling of elation coupled with fatigue from a difficult

job well done and from a sense of relief was recognised in astronauts by Ruff & Korchin (1967). McGrath (1970) recognised that coping behaviour could take place before, during or after a stress inducing condition and that when it did occur it might be directed either towards prevention or removal of the condition or towards preventing or undoing the effects of that stress. The post anxiety behaviour engaged in by firefighters mentioned above has also been found by Bond (1952) in his study of proactive mastery of stress in combat pilots.

Although there is a certain amount of introspection by individuals with regard to their performance the S's in this study also placed great emphasis on the inter-relationships with their colleagues and the passage of information openly between them after an incident. Because of the emphasis that S's placed on these interrelationships, built up through normal station activities, it seemed that this type of socially orientated positive affect (SOPA) was an important factor in helping firefighters to cope with the stress that they experienced when attending incidents. Whilst at an incident there seemed to be a period just after the main part of the work has been completed i.e. the fire is out or the person trapped is released, when the crew gather together informally and spontaneously to exchange their personal experiences of the incident.

This behaviour can be labelled 'jigsawing', and this

first stage may be necessary for the individual to gain a first or 'flimsy picture' of the whole of the incident. 'Jigsawing' continues on return to station and in more detail with similar experiences that individuals have encountered in the past being used to strengthen arguments, make points more coherent or simply as an interesting aside to produce a more valuable or 'rich picture' of the incident and fit it into some form of context. This type of behaviour has been commented on again by Bond (1952) in relation to combat pilots. Bond sees this type of behaviour, together with an individual's constant thought repetitions about an event or events, as a toughening process which never ceases, becoming active with each new threat, widening the range of competence but also expanding the range of cues capable of arousing anxiety. Bond postulated that through these processes, the individual proactively masters stress. It seems that 'jigsawing' is a similarly necessary process in order that firefighters can 'work through' their own experiences at an incident and from both the 'flimsy' and 'rich' pictures gained are able not only to dissipate and reduce anxiety that has accumulated over the incident through SOPA, but also help them to proactively master stress by expanding and modifying their coping strategies and gradually building on their experience.

It was also noted that firefighters engaged in a range of 'off the cuff' activities on the station, from

lighthearted (but sometimes 'pointed') banter to childlike pranks. These types of activities could be the outcome of displacement of anxiety across the whole tour of duty acting both proactively and retroactively, or part of the overall coping process flattening out any phasic changes in levels of anxiety due to the expectancy of receiving a call at any time throughout the 'on duty' period.

It became clear during the interviews that the effects of stress were acting well past the period of the incident and on occasions were carried into off duty/arrival home time. As this seemed to be a factor that needed to be considered the remaining S's were asked about how they felt when getting home directly after coming off duty. A number of S's felt irritable on arriving home and put it down to tiredness, two S's stating that their wives could determine how busy they had been by the degree of irritability they displayed. It is suspected that these behavioural patterns, occuring sometimes hours after an incident, are part of the coping process. A number of researchers have made the point that emotional responses to stressful situations may be delayed for periods in excess of a few minutes or hours. (Basowitz, Persky, Kitchen & Grinker, 1955; Davis, Elmadjion, et al. 1952; Grinker & Spiegel, 1945) and it appears from S's answers that this may indeed be the case. Professional competence is seen by S's to be of fundamental importance to them and this is borne out by

the values they place on self esteem, judged from their comments on the most stressful events they experience both in training and in fires, i.e. fear of making mistakes and letting colleagues down, being supervised by senior officers etc. (Tables 3.3, 3.6, 3.7, 3.8 and 3.12). Similar emphasis on professional competence has been found in the past by Ruff & Korchin (1967) in their study of Mercury astronauts.

From the results of the questionnaire analysis there were four important identifiable variables in a firefighters work:- a) stressful events, b) socially orientated positive affect, c) competency and d) physical activity. The main finding of the present study was that S's training produced a background of experience leading to automaticity in responding which in turn was a pre-requisite for eventual coping with real situations. It also seemed likely that coping strategies were built up through experience gained both through training and operational incidents and that adaptation was the manipulation of the array of coping strategies an individual 'holds' to fit the particular situation.

What the present study attempted to do was to integrate and interpret the results of a qualitative approach with those from a more quantitative methodological background. Parallels have been drawn and there appears to be a fair amount of agreement between the present study and those reviewed. However, there are a

number of areas and questions that need to be studied further. Firstly, the data in the present study was gathered by a semi-structured interview and the subjective analysis was only regarded as a qualitative foundation for further quantitative research. Secondly, with regard to training, there is a need to look at the effect training has both on recruit and experienced firefighters with regard to the eventual production of coping strategies and adaptational responses to reduce anxiety. This may be the most challenging and yet the most elusive area to study. As Mechanic notes 'persons who have well developed skills to meet challenges and environmental demands are less likely to suffer from discomfort and feelings of loss of confidence. In short, the adequacy of preparation is one of the major determinants of what situations are experienced as stressful' (1970). Thirdly, in the case of attending fires and other emergency incidents, it seemed that experienced firefighters showed increases in anxiety from the alarm until arrival at the incident, decreasing rapidly as their perception of the incident developed and mastery of the situation gradually took place. This finding was counter to the inverted V shaped curves and 'displacement of fear back in time' found by Fenz & Epstein (1967) in their studies of novice and experienced sports parachutists. Clearly, firefighters, unlike parachutists, could not anticipate when a fire or emergency incident would occur and therefore Fenz &

Epstein's time envelope did not seem appropriate. The firefighters in the present study seemed to show the same patterning of phasic response that was found by Halse et al (1978) where army parachute trainees showed a phasic response to each jump, producing falling tonic gradients as a function of time and experience. Even though the research reviewed showed that levels of fear and anxiety are felt to reduce with experience, when they are experienced, they still have to be displaced or 'worked out of the system' in order to complete the coping process. This displacement may be facilitated by a number of mechanisms, one of which has been recognised as the 'jigsawing' process and there is a need to research this area.

Lastly, one of the most interesting findings to emerge from the present study was the emphasis S's placed on competence, both in themselves and their colleagues, and this may be of fundamental importance to them in carrying out their job. It will therefore be necessary to see how far competence varies through the different stages of an emergency incident and also how far experience affects it. The present study has gathered preliminary information on the various kinds of situations that firefighters experience as stressful. These situations were not only confined to emergency incidents but also to day to day work activities. Amongst the situations that were identified as stressful, were situations that seemed

to act as coping strategies for the reduction of anxiety that was experienced when dealing with stressful situations.

Firefighters work in situations which are not conducive to the measuring of psychological and physiological functions and, as Mechanic states, 'if one attempts to study persons who cope successfully with stressors (frequently so successfully that they are unaware of variations from ordinary situations), it is extremely difficult to get respondents to recognise and report their own coping skills' (1970). Further studies will have to be done in naturalistic settings which may prove difficult without a completely controlled environment, but it is felt that the richness of the data gathered from such a situationally based approach will outweigh the disadvantages of this type of methodology.

3.5 Conclusion

The present study was designed to gather information from a number of firefighters in order to build a 'picture' and frame of reference around those situations that they encountered in their working environment and which they felt were stressful and made them anxious. Also, it was hoped that strategies for coping with those situations would be highlighted.

It was found that there were a number of emergency situations which firefighters felt were stressful, especially 'persons reported' fires and special services

calls where people were involved. Throughout the stages of an emergency call firefighters reported feeling most anxious whilst en-route to the incident. This anxiety started to reduce on arrival when firefighters confronted the scene and continued its reduction throughout the latter stages of the call. During this period, they engaged in conversations with colleagues about the incident and these continued in more depth on return to station. This process had been identified in the present study as a possible major strategy for coping and was termed 'jigsawing'.

There was also agreement amongst those firefighters studied that training could be stressful on occasions and a number of other stressful situations were identified e.g. having your performance watched by a senior officer, criticism from colleagues etc.

From the results of the present study, there seemed to be four important aspects of a firefighters work:-

i) stressful events

ii) socially oriented positive affect

iii) professional competency

iv) physical activity

In order to probe the preliminary findings of the present study further, a quantitative analysis which could provide a form of measurement, especially for the four factors above, was felt to be appropriate.

The following chapter provides this quantitative

approach whilst using the data gathered from the present study as the frame of reference to this methodology.

CHAPTER 4

4 FIREFIGHTERS WORK - AN ANALYSIS BY MOOD CATEGORIES

4.1 Introduction

In the previous study a semi-structured interview technique and subsequent analysis of the transcripts was used in order to identify those times, circumstances and situations which firefighters thought were stressful whilst they were at work, as well as giving an indication of any mechanisms and/or strategies they adopted in order to cope with that stress and anxiety.

The results of the study suggested that experienced firefighters (those with more than 4 years service) felt anxious during training (mainly due to fear of failure, or close supervision by a senior officer) and more interestingly, during different times throughout their attendance at an emergency incident. Travelling to the incident and arriving at the incident seemed to be the most stress inducing and anxiety provoking periods. However, during the stage of the incident where they were actually working, it was clear from S's statements that although they felt that they were operating with habituated responses (automaticity), they were employing coping strategies to deal with the situation they were faced with. Some of these coping strategies were built up during training and through experience. It was also felt by S's that the fear and anxiety which built up during an incident subsided once they had returned to their fire

station after the incident although some thought that this reduction was a gradual decrement which continued for some time after, and on occasions, until they arrived home after their shift.

It was not clear whether the anxiety felt in one situation was the same as for the other. Also, such factors as fear of failure, stress of an emergency incident etc. were sometimes not immediately experienced and may 'build up inside' within the individual and reduce at differing rates. These examples suggested that there may be some factor of a multidimensional nature which could account for these phenomena.

Three other factors which seemed to be important to S's were professional competence, activation and the close social relationships they had with their colleagues. These social relationships seemed to be more prominent on two specific occasions during an incident. Firstly, immediately after the main work at the incident had been completed, S's would stand and talk about their own experiences at that incident. Secondly, on return to the fire station, further accounts of the incident combined with past similar experiences were shared between the S's so that they gained a 'rich picture' of the whole event in order to fit it into some form of context. These interactional processes have been termed 'jigsawing'.

In order to explore further the processes involved, a form of quantitative measure could be used to take account

of the feelings of firefighters at a given point in time. Because of the nature of a firefighter's work, it would be impractical to administer any form of test e.g. physiological measures, reports etc. at a precise time within an emergency situation. The measure chosen had to be able to recall as accurately as possible the firefighter's feelings. In other words, the feelings must be able to be recalled and the temporal nature of the measure had to be sufficient to span the short period of time before being asked to recall it without fading. It was therefore decided to use a simple measure of mood state which S's completed by imagining or envisaging their feelings at different times in an incident.

Nowlis (1965) reviewed research with the mood adjective checklist and found that the term mood was used to apply to the following features of behaviour and experience:-

i) Temporary tendencies in order to highlight or otherwise certain characteristics under certain specified circumstances.

ii) Higher order dispositions.

iii) The 'set' of the whole person rather than one particular motivational or behavioural system. It could therefore be assumed to be multidimensional in nature. Mood also includes broad categories of behavioural activities and experience.

iv) Constancies of behaviour and experience during a particular period in time, even though mood terms are mostly used at times when changes in the individual are noted.

Nowlis suggested a general definition of mood as the effect on an individual of his or her own configurations of activity. These configurations could be conceptualised as patterns of general functioning including levels of activation, levels of control, levels of concentration, direction of social orientation and positive and negative (pleasant and unpleasant) general appraisal. All these have an effect upon an individual and are mediated by events within the individual's environment which elicit certain responses.

A number of researchers (Bohlin & Kjellberg, 1975; Kjellberg & Bohlin, 1974; Meddis, 1972; Sjoberg, Svensson & Perrson, 1979; Svensson, 1977) have factor analysed scales used in mood adjective and self reported arousal checklists and it has been generally concluded that there are between 4 and 6 bipolar factors that can be identified.

Wilkie (1981) reviewed the data from a number of studies which used mood adjective checklists. He found that using a subset of Bond & Lader's (1974) adjectives a factor analysis outlined 3 factors which were similar to Bond & Lader's findings. Nowlis (1961) on the other hand, suggested 4 bipolar dimensions i.e. activation -

deactivation, positive social orientation - negative social orientation, control - lack of control and positive appraisal - negative appraisal. Nowlis also found 12 unipolar factors. The response scale that Nowlis used consisted of 4 points i.e. not, cannot decide, a bit and definitely. Meddis (1972) factor analysed a selected set of Nowlis's adjectives with a response scale of definitely not, not, slightly and definitely which produced a 4 factor solution. Wilkie (1981) used 70 adjectives and after the initial extraction of factors, 8 accounted for the majority of the percentage of variance. These 8 factors were labelled as anxiety, activation, competence, elation, good nature, apathy, happiness and anger. After rotation of these factors, a 5 factor solution was found i.e. anxiety, activation, competence, happiness and good nature. Wilkie proposed a 5 category mood scale consisting of 15 sets of adjectives. These adjectives were similar to the factors that the pilot survey suggested needed further empirical research.

Using an analogue scale similar to those analysed by Bond & Lader (1974) in the rating of subjective feelings, a response form was designed which would measure the 5 categories of mood suggested above. The 'positive' ends of the mood scale adjectives were placed either on the right or left of the scales randomly to avoid the influence of response set.

The aim of the present study was to provide

quantitative data using the concept of mood categories to confirm or otherwise the times, events amd situations which firefighters said were stressful. A quantitative measure that was simple to administer, temporal in nature and would provide quantitative data in different situations was the mood adjective rating scale. It was felt that the concept of mood and its multidimensionality would help in the identification of stressful and anxiety provoking situations.

4.2 Hypotheses

Mood as defined by the 5 different mood scale categories was expected to significantly change over the stages of an emergency call as follows:-

4.2.1 Hypothesis 1

The previous study in Chapter 3 showed that firefighters stated that they were more anxious from the time of call and travel to the incident compared to after arrival at the incident and return to station. This was counter to Fenz & Epstein's (1967) findings of fear and anxiety in experienced sports parachutists. It was therefore predicted that anxiety should show a phasic response increasing from the time of call through the en-route stage of the call and decreasing from after arrival until return to station.

4.2.2 Hypothesis 2

Activation would increase from the time of call until the arrival and firefighting stage.

4.2.3 Hypothesis 3

Competence would increase from time of call until immediately after the incident.

4.2.4 Hypothesis 4

Happiness and good nature would show similar curves to each other throughout the stages of a fire call showing at first a negative response but increasing in positivity during the 'immediately after the incident' and 'on return to station' stages of a call. As it has been suggested that jigsawing may be a process involved in the reduction of anxiety, it was further hypothesised that the increase in positivity of happiness and good nature may be linked to the jigsawing process and during these phases would bring about an increase in relaxation.

4.3 Method

4.3.1 Subjects

Seventeen out of the eighteen experienced firefighters interviewed in the previous pilot survey were further investigated in this study. The eighteenth firefighter was 'dropped' because of unavailability at the time of sample. Their average length of service was 9.5 years. All subjects were working on the same operational fire station and spread over three watches (shifts). It could be argued that the same subject sample might contaminate the results of the earlier study. However, no feedback of the previous study had been given to the S's and the information from the study was given by the S's

themselves. Exposure to the Fenz & Epstein (1967) results in the previous study may also have been a cause of contamination. However, hypothesis 1 was counter to the findings of Fenz & Epstein (1967) and a failure to reject the hypothesis would support the argument that the results were not contaminated. Also, the present study used a completely different methodological approach. Because of these reasons, it was felt that contamination would not occur.

4.3.2 Mood Scale

The five categories of the Mood Scale form used bipolar dimensions, three for each mood category (see Appendix 3 for sample of the mood scale). Between each dimensional set of adjectives, a line of 70 millimetres was drawn to represent the full range of each dimension and subjects were asked to complete the mood scale by working down the sheet marking the line between the end points with a perpendicular pen stroke at a point on the line which was equivalent on that dimension to how they felt at that time. This method of completion was considered appropriate to avoid the threat to validity due to response styles of the individual, cueing and labelled response sets.

The mood scale also contained instructions on completion and also a section to identify the tour of duty or emergency call the subject was working or attending and the date and time of completion.

4.3.3 Procedure

All S's were given verbal instructions in groups according to their watch and were given their package of mood scales, written instructions and a time-table, (see Appendix 4). Each S, had a time-table with the times during each working shift when the mood scale should be completed. Each S was assigned randomly to one of two groups on the programmed regime so that the mood scales filled in would cover all time sampling periods over a full tour of duty (two days and two nights).
The times that S's were asked to complete a form coincided with periods during normal station routines where there was a break or change of routine (see Appendix 5 for breakdown of station routine). The results of these mood scales were to provide baseline measures of mood at intervals throughout the shifts. They would therefore provide an overall baseline measure for each mood category when comparing mood category data for stages of an emergency call.

In order to assess variations in the five categories of mood state when firefighters attended emergency calls, each S was asked to complete four mood scales for each call they attended during a full tour of duty to correspond with the following stages of the call:-

i) En-route to the call

ii) Arrival and at the incident

iii) Immediately after the incident

iv) On return to the station

Naturally, S's could not complete these forms during those periods but were asked to complete them retrospectively, immediately they had returned to their station.

In the case of malicious false alarm calls and 'known small fires', i.e. grass, rubbish in the open etc. S's were asked to complete the mood scales only for the first of these calls that they attended during the complete tour of duty. These types of calls are frequent in the fire service and it was felt that mood scales filled out for each of these calls would produce an inordinate amount of the same data. S's were asked to place their completed forms in an envelope provided after each shift was completed, mood scales filled in after the tour had ended being brought in on the next tour of duty. The officer-in-charge of each watch ensured that the S's completed the mood scales at the apprpriate times.

The use of seventeen subjects on three watches meant that the spread of response forms would cover 6 x 24 hour periods covering twelve seperate tours of duty.

4.4 Results

Each mood scale was scored by overlaying a scale which measured the distance of the S's mark from the negative pole of each pair of adjectives and allotting marks from 1-7 (negative to positive). An overall score for each category was derived by adding the scores from each of the three relevant pairs of adjectives and

calculating the average.

The timetable scores from the mood scales were calculated for each individual, aggregated together by mood category for each time sample point, and a group mean score derived for every time sample point for each category. Tables 4.1 and 4.2 show these timetable group mean scores. The mood scales completed for emergency calls were calculated and aggregated in the same manner and the group means tabulated for each stage of a call.

Table 4.3 shows the collective data for stages of a call, the mean scores for both day and night shifts over the test period (normal duties) and the group mean scores for the arrival home after the shift period.
An analysis of variance on the scores in Table 4.3 revealed a slightly significant ($p<.05$) mood categories effect but more interestingly, the interaction effect between mood categories and stages of a call (time) was significant at $p < .001$ level supporting the general hypothesis. The summary table for the analysis of variance is presented in Table 4.4.

A test for simple effects was carried out to determine whether there were any significant differences in the scores for individual mood categories across the stages of a call. Table 4.5 shows the summary for the test of simple effects. Relaxation, competence and

TABLE 4.1 MEAN SCORES BY MOOD CATEGORY OVER TWO DAY DUTIES

CATEGORY	TIME SAMPLE POINT							
	0800	0930	1100	1300	1500	1600	1700	1800+
RELAXATION	4.72	4.68	4.77	4.98	5.29	4.94	5.51	5.98
ACTIVATION	4.29	5.32	5.32	4.88	4.89	4.69	4.70	3.62
COMPETENCE	4.79	5.44	5.20	5.53	5.55	5.38	5.34	5.22
HAPPINESS	4.22	4.19	4.27	4.41	4.53	4.51	4.66	5.08
GOOD NATURE	5.18	4.90	5.19	4.39	5.18	5.28	5.52	5.66

(N=17)

TABLE 4.2 MEAN SCORES BY MOOD CATEGORY OVER TWO NIGHT DUTIES

CATEGORY	TIME SAMPLE POINTS 1700	1800	2000	2200	2300	0800	0900+
RELAXATION	4.71	5.06	5.14	5.70	4.78	5.23	5.69
ACTIVATION	3.58	4.96	4.16	3.99	2.88	2.96	3.15
COMPETENCE	4.47	5.36	4.78	5.06	4.42	3.96	4.38
HAPPINESS	4.21	4.39	4.47	4.50	4.25	3.64	4.97
GOOD NATURE	4.44	4.36	4.72	5.28	4.14	3.88	5.04

(N=12 NIGHT 1)
(N=13 NIGHT 2)

TABLE 4.3 MEAN SCORES FOR ALL EMERGENCY CALLS ATTENDED INCLUDING OVERALL MEAN SCORES FOR NORMAL DUTIES AND ARRIVAL HOME TIMES

MOOD CAT.	STAGES OF A CALL					
	NORMAL DUTIES	EN-ROUTE	ARRIVAL AT INCIDENT	AFTER INCIDENT	RETURN TO STATION	HOME
RELAXATION	5.2	3.90	4.40	5.70	5.6	5.8
ACTIVATION	4.3	6.02	5.99	5.10	4.7	3.5
COMPETENCE	5.1	5.93	6.04	5.52	5.4	5.0
HAPPINESS	4.4	4.85	4.62	4.56	4.7	4.9
GOOD NATURE	5.1	5.25	5.08	5.21	5.6	5.5

TABLE 4.4 SUMMARY TABLE OF ANALYSIS OF VARIANCE- TIME TO MOOD CATEGORIES. (N=17)

SOURCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	131.656		16				
WITHIN Ss TOTAL	457.422		493				
TIME PERIOD		10.72		5	2.144	2.05	NS
TIME ERROR		83.65		80	1.046		
MOOD CATEGORIES		41.286		4	10.322	8.02	<0.05
MOOD CAT. ERROR		82.371		64	1.287		
TIME X MOOD CAT.		137.42		20	6.871	21.562	<0.001
TIME X MOOD CAT.ERR.		101.973		320	0.319		
TOTALS	589.087		509				

TABLE 4.5 SUMMARY TABLE OF SIMPLE EFFECTS OF TIME PERIOD WITHIN MOOD CATEGORIES(N=17)

SOURCE	*SS*	*DF*	*MS*	*F*	*P*
POOLED ERROR		287	0.704		
RELAXATION	47.324	5	9.465	13.443	<0.001
ACTIVATION	76.728	5	15.346	21.795	<0.001
COMPETENCE	13.917	5	2.783	3.953	<0.01
HAPPINESS	3.24	5	0.648	0.92	NS
GOOD NATURE	2.408	5	0.482	0.68	NS

activation showed a significant variation of effect, at the .01 level and beyond. Inspection of Table 4.3 indicates that these results supported the predictions of hypotheses 1, 2 and 3 i.e. anxiety (i.e. lower relaxation) increased from the moment a call was received until arrival at the incident decreasing sharply from that point until return to the station. Activation increased from the time of call until the arrival and firefighting stage decreasing rapidly immediately after the incident until return to station. Competence did not show such a marked effect as anxiety and activation but there was, nevertheless, an increase through the first two stages of a call but decreasing, contrary to the hypothesis, in the immediately after the incident stage. Both good nature and happiness did not show any significant changes throughout the stages of a call and hypothesis 4 was rejected.

4.5 Discussion

The purpose of the study of normal duties on a shift was to establish baseline measures for all mood categories across all shifts.

The analysis for simple effects showed that relaxation, competence and activation each varied significantly over the stages of a call. As the job of firefighting is a physical and active one, it is self evident that S's level of activation would increase rapidly during the initial stages of a call. More

interestingly, it could have been predicted that in the light of previous findings on experience and anxiety (Epstein & Fenz, 1962, 1965; Fenz, 1975; Fenz & Epstein, 1962, 1967; Halse, Blix, Ellerston & Ursin, 1978.) where the results tended to suggest that anxiety and fear reduced with experience, S's should not have shown any marked reduction in relaxation i.e. increase in anxiety, as all S's in the study were experienced. However, this was not the case and S's produced an immediate negative phasic response to relaxation in the en-route stage with a gradual reduction in anxiety once the arrival and firefighting stage had been reached. It is presumed that this reduction is a product of the perception of the situation upon arrival at an incident combined with the gradual mastery of that situation brought about by S's activation and feelings of professional competence which were found to be raised en-route and at the incident.

Halse et al (1978), in a study of self-rating of fear in Norwegian Army parachute trainees, showed that there was a phasic response for each jump from a mock parachute tower but that over time there was a gradual decrease in the levels of self reported fear as training progressed producing a falling tonic gradient. This could be similar to the present study where S's, through experience, still showed an increase in anxiety in the initial stages of attending a call but the increase might be less than for novice or inexperienced firefighters. A comparative

analysis of more and less experienced firefighters together with a longitudinal study of trainees is therefore essential to see if this is the case.

Professional competence was found to be of fundamental importance to firefighters in the pilot survey and the results of the present study showed that the feelings of competence rose significantly throughout the early stages of a call, reducing once the anxiety provoking stages had passed. This, it could be argued, is conterintuitive as it may be thought that the most dangerous periods of a call, i.e. en-route, arrival and firefighting, would make S's feel less competent until they had mastered the situation. It could also be argued that the emergency call is what they have trained for and they therefore started to feel competent when they receive one. A definition of competence must therefore contain an amalgam of many factors such as self-esteem, confidence, skill, ability and performance. Similar emphasis on professional competence has been found in Mercury Astronauts by Ruff & Korchin (1967). It is felt that professional competence may be built up through training and experience and a comparative analysis needs to be made between novice and experienced firefighters to determine how professional competence is acquired.

Although hypothesis 4 was rejected, it still seemed clear from the emphasis that S's placed on jigsawing in the pilot survey that it was a process that was important

in coping. It may be that happiness and good nature are not sensitive or direct enough measures of this process or that the interpretation of those mood factors by S's was too varied to produce a significant result. Alternatively, the hypothesis could have been wrong. However, it is interesting to note that good nature, although its simple effects were not significant, mirrored closely the relaxation scores even into the off-duty arrival home stage. Good nature on its own may only be a crude indicator of jigsawing and may have been producing a palliative effect on levels of anxiety. A more sensitive measure is needed to confirm more clearly the jigsawing effect.

The mood scales filled out by S's according to the timetable can be thought of as accurate at that particular time. The mood scales for attendance at incidents were completed retrospectively (it would be unreasonable and/or impractical to ask S's to complete them during an incident) and they may have lost some validity for this.

However, there are many practical problems with the validity of the data when it is gathered by self-report techniques which are retrospective. Nystedt (1983) points out that the reconstruction of situations may be based on both remembered and inferred events and that the longer time has passed since the individual experienced the situation then the more the reconstruction is based on remembered inferences. A further problem of retrospective

data is that it does not capture the dynamics involved, especially in stress research where the stress response itself, as well as the situation is dynamic. Perceptions of such situations may vary over time and the reaction of an individual to a situation at one point in time may be unrepresentative of the overall perception and reactions over time.

The main problems of validity in self-report questionnaires similar to the one used in the present study were noted by Bailey & Bhagat (1987) as firstly, response style. This is where the respondents way of answering questions is not influenced by the questions contents. Also, items may be marked at extremes of a continuum or marked at the middle or neutral point of the continuum. Secondly, reactivity, which is the change of response by a respondent due to knowledge of being observed or assessed. Indeed, within the present study, and taking account of the discussion above on restrospective data, it could be argued that the completion of the mood scale became in itself a part of the 'jigsawing' process, a type of 'self-debrief'.

The strength of the mood scale data may lie in taking up the interactionist position by questioning S's about their individual responses in specific situations. Further appeal to their validity may be added because the situations themselves were real, not predetermined or predefined or chosen by the researcher as is normally the

case in many situationally based questionnaires. The study was also longitudinally based, sampling being continued over time throughout a complete tour of duty.

Each specific incident was new to the S's, even though they were experienced, and as such, any definition of experience must be sufficiently broad based to include the mastery of stress through the development of coping strategies borne out of past encounters with dangerous situations as well as through experiencing the experience of others through jigsawing. A number of researchers have recognised the need to have dynamic longitudinal studies of stress, anxiety, coping behaviours and person by situation interactions (Endler, 1981; Frese & Zapf, 1988; McGrath, 1970).

The implicit question in these demands must be how far experience of a situation or similar situations affects the way in which an individual reacts to it and feels about it.

4.6 Conclusion

The general hypothesis that mood as defined by the five different categories:- activation, competence, relaxation, happiness and good nature, would change significantly over the stages of an emergency call, was supported by the ANOVA showing a significant interaction effect ($p<.001$).

A test of simple effects showed significant differences in activation, competence and relaxation in

the predicted direction. Activation increased from time of call until the arrival and firefighting stage whilst competence increased from the time of call until immediately after the incident. Anxiety (lower relaxation) showed a phasic response which increased from the time of call and decreased from after arrival until return to station. Happiness and good nature, although showing a trend in the predicted direction, did not show a significant result.

Payne, Fineman & Jackson (1982) suggested in a study of the measurement of work anxiety that there was a need for cross-sectional comparative analyses of experiened groups of workers and also between experienced workers and recruits to an organisation. The latter would preferably need to be longitudinal.

Before proceeding to compare the experiences of more and less experienced firefighters, the next chapter presents a study of a particularly serious incident that occurred during the course of the research.

CHAPTER 5

5. STRESS, ANXIETY AND COPING IN FIREFIGHTERS - A REAL LIFE DISASTER : POST DISASTER STRESS

5.1 Introduction

This chapter describes a study of a number of firefighters who attended an event which happened on 22 August 1985 at Manchester International Airport. The event was a particular example of incidents that have been described in previous chapters and which firefighters have to attend.

From the result of the interviews in Chapter 3 and the mood scale analysis in Chapter 4, it was found that firefighters training and the experience they built up through attending operational incidents produced an array of coping strategies. These strategies could then be used by the individual to fit or adapt to a particular situation. Coping, together with the feeling of professional competency seemed to lead to the mastery of stress.

The Manchester Air Disaster was an example of a particular event which provided an unusual case study as this could be described as a 'once in a lifetime' experience for the firefighters who attended the incident. It also provided a unique opportunity to study a number of firefighters who attended the incident using the methodologies of previous chapters.

The disaster took place on the runway when a Boeing

737, bound for the holiday island of Corfu, began its take-off run at approximately 0713 hrs. The aeroplane was carrying 137 passengers and crew and whilst it was gathering speed, the port engine malfunctioned, the port wing fuel tank was holed and a massive fuel fire enveloped the aircraft. Fifty-four people perished in the aeroplane, one person was rescued from the burnt out fuselage by local authority fire service personnel and eighty-two of the passengers and crew managed to escape from the burning fuselage. Fire service crews from the Airport, Cheshire County and Greater Manchester fought the fire and were engaged directly for the next two and a half hours in the grim task of the handling and recovery of the bodies.

Taylor & Frazer (1982) in their study of the stress of post-disaster body handling and victim identification, reviewed the literature on disaster stress. They noted that there was hardly any work which mentioned the study of rescue and recovery personnel, quoting Quarantelli & Dynes (1977) remark that the stress effects for those personnel who work in the recovery and handling of the dead "remains an almost unknown topic".

The methodologies employed by Taylor & Frazer were:

i) clinical interviews;

ii) behavioural ratings;

iii) structured questionnaires, photographs, private notes and official documents; and

iv) formal responses by the subjects to the Hopkins Symptom Check List (HSCL).

Their conclusions were similar to those of Duckworth (1986) that disaster stress was best seen as a complex interaction between environmental and task stressors, job competency, perceptual and emotional defences, management and follow-up support. They also suggested that emotional de-briefing might reduce levels of stress if it were used as a routine end to a disaster situation.

The study in Chapter 3 gathered information on stress, anxiety and coping in firefighters using a semi-structured interview technique. The study concluded that apart from experiencing varying levels of stress and physical activation at different stages in attending an emergency incident, there seemed to be two other factors which were important to firefighters:-

i) the need to display professional competence

ii) the need to maintain close social relationships that they had with their colleagues

This led to the hypotheses that were postulated in Chapter 4.

These two factors seemed to be of most importance immediately after the main work at an incident had been completed and also on return to the fire station when firefighters would attempt to fit their particular role into an overall picture of the event. This process was termed 'jigsawing' and was in the main a socially aimed

process used by individuals and the group to reduce anxiety and to gain competence and satisfaction. Also, it could be used to complete the 'rich picture' of what was going on in order to construe the individual's own behaviour and actions as professionally competent or at the least, excusable in the circumstances.

The study in Chapter 4 used a five category bipolar mood adjective check list in order to assess variations in mood states when firefighters attended emergency calls. Each emergency call was divided into four stages: 1) en-route to the call, 2) arrival at the incident, 3) immediately after the incident, and 4) on return to the fire station. Naturally, subjects could not complete the mood scales during those periods and were asked to complete them retrospectively, immediately they had returned to the fire station.

Out of the five categories of mood (relaxation, activation, competence, happiness and good nature) it was found that relaxation decreased and activation increased during the initial stages of an emergency call, whilst competence, contrary to the prediction, increased during the initial stages, reducing once the stressful stages had passed. Happiness and good nature, together with competency, were thought to be a predictor of jigsawing but they did not reach significance although they showed a trend in the predicted direction at those stages of a call where 'jigsawing' was thought to be taking effect.

The two studies used data gathered from firefighters attending a variety of emergency incidents which, although to the layman are unusual, to the professional firefighters are routine.

The disaster which occured at Manchester International Airport provided an instance of an unusual incident which was not routine and was therefore a unique opportunity to study post-disaster stress with some of the firefighters who attended the incident from the initial call through to the removal of the bodies from the aircraft and the final clearing up operations. The present study used the previous methodologies of a structured questionnaire and a mood adjective checklist to determine both the immediate and long term impact of disaster stress. Also the methodologies would highlight coping strategies that individuals employed in dealing with this unusual type of situation.

5.2 Method

5.2.1 Subjects

23 firefighters (including officers) from the Greater Manchester Fire Service took part in the study. All S's were from one watch on two fire stations in Greater Manchester which would attend any emergencies at Manchester International Airport. Of that number, 14 attended the incident from the initial call, whilst the remainder, who had not attended the incident because they were off duty at the time, were used as a comparison group

for the mood scale part of the study. The comparison group was used to provide baseline measures from the mood scales along with the group of firefighters who attended the incident. The condition under investigation was 'did attend the disaster' and the control group provided the comparison 'did not attend the disaster'. The average age of the S's was 30.3 years and their length of service in the fire brigade varied from 3 to 20 plus years. Unfortunately, it was not possible to commence the study immediately after the incident and it was decided that it should take place around the '8 month after' period in order to avoid the '12 month anniversary phenomenon' (Russell Davies, 1972) and also before the full Coroner's Inquest was held, when the disaster would once again become prominent.

5.2.2 Structured Questionnaire

The structured questionnaire was designed to assess the immediate and long-term impact on S's of the disaster and also the coping strategies that they employed, especially with regard to body handling. Questions ranged from how S's felt at the disaster and how they felt now about the disaster, what were the most stressful/anxiety provoking periods that they recalled and what strategies they adopted for the handling of bodies. Further questions were asked about whether S's had talked over the experiences and with whom. After each question sufficient space was left for S's to amplify their statements if they

so desired. Appendix 5 shows a sample questionnaire.

5.2.3 Mood Scale

The mood scale was the same instrument that was employed in Chapter 4.

5.3 Procedure

5.3.1 Sructured Questionnaire

14 firefighters and officers who had attended the disaster completed the structured questionnaire. 9 S's filled out the questionnaire at the time of the sample, whilst the remaining 5, who were not immediately available were contacted at their homes, asked to complete the questionnaire and posted it on immediately.

5.3.2 Mood Scale

18 S's completed the mood scale, the 9 who were immediately available and who had attended the disaster and a further 9 who did not attend and acted as a comparison group. All S's filled in the mood scale at the same time and were first asked to complete one mood scale, rating their general feelings at the time of the sample (19 April 1985).

Those S's who attended the incident were then asked to complete a mood scale in retrospect of how they felt whilst at the disaster. All S's were then asked to rate their feelings about the incident at the time of the sample.

5.4 Results

5.4.1 Structured Questionnaire

5.4.1.1 Immediate Impact

6 S's stated that the disaster had no significant effect on them. This self report by the 6 S's could be true but it could also be attributed to defence mechanisms or retrospective reconstruction. Of the 8 S's who thought that it affected them, 3 were clearly upset at the time about the large loss of life with one stating that he could not talk about the incident until some weeks after, the other two expressed feelings of shock, annoyance and inadequacy. Another subject stated that initially he spent restless nights in bed for 3 or 4 nights after, going over the events again and again when he had a moment to himself. This reiteration process lasted for approximately 4 weeks. Of the remainder of S's, one felt that he had an immediate fear of travelling by air which had now diminished, whilst one of the youngest (age 22) showed a 'bravado' effect stating that he had a feeling of 'I was there'.

8 S's felt stressed when handling the bodies on the aircraft. 2 S's gave no explanation as to the way in which they felt stressed but 4 thought that the cause of stress was directly attributable to the number and state of the bodies whilst the other 2 S's felt stressed by the thoughts of relatives and friends of the deceased and that only a few minutes earlier, all were alive. Only one

subject said that he felt physically sick.

When S's were asked at what time during the incident they felt most stressed or anxious two stated that they did not feel stressed or anxious at all. Of the rest, 2 felt most stressed or anxious during the incident, 2 both during and immediately after the incident, 4 immediately after and the remaining 4 S's, sometime after.
Table 5.1 shows the variety of answers given by S's when asked to describe their emotional state at the time and immediately after the disaster.

5.4.1.2 Long Term Impact

None of the S's felt that they had experienced any emotional problems as a direct result of attending the disaster although 5 S's still had 'flashbacks' of the incident with a further subject stating that his 'flashbacks' stopped about 2 months after the incident. Most of these 'flashbacks' were triggered either by direct mention of the incident, by going to emergency calls to the airport or by the showing of similar incidents on the television.

When asked if they had noticed any change in themselves after the disaster, 10 S's answered that they had not, whilst of the remaining 4, one felt that there was a change for a few days after, another felt he had gained in professional competence, one had a more relaxed outlook on life and it had made another more aware of the dangers of travelling on aircraft. No S's felt that they

TABLE 5.1 Ss DESCRIPTION OF HOW THEY FELT AT THE TIME OF AND IMMEDIATELY AFTER THE INCIDENT

Ss RESPONSE	No. OF Ss
very sad	3
deep sense of sorrow	1
physically sick	1
upset	3
helplessness	1
concern for relatives	1
hid emotion in front of colleagues-showed when at home	1
too busy making decisions	1
could not stop thinking about it in an objective workwise way	1
felt on a "high" knowing I would be asked about it	1

had had any other experience that they could attribute directly to the disaster.

Table 5.2 shows the responses from S's when asked to describe how they felt about the disaster and the handling of bodies at the incident at the time of answering the questionnaire. S's answers to this question divided into 3 categories:-

i) those who confined their comments to their profession (professional comments)

ii) those who commented on how they felt as individuals (personal comments)

iii) neutral/no comments

5.4.1.3 Coping Strategies

All S's stated that they felt that they had coped with the stress of handling the bodies. When asked if they employed any type of strategy to help them cope, 9 S's stated that they did not. Of the 5 remaining S's, one just thought it was his job and got on with it, 3 S's tried not to think of them as humans and one tried not to look at their faces. Only one subject had used a similar type of strategy in the past (by trying not to relate to them as people). 4 S's remarked that they still used a similar strategy, 2 of those using it sometimes and the other 2 using it always.

S's were asked if they had talked over their experiences with others, and if so, with whom and how often. 13 S's stated that they had. The results of this

TABLE 5.2 Ss FEELINGS ABOUT THE DISASTER AND BODY HANDLING AT THE TIME OF ANSWERING THE QUESTIONNAIRE

Category	Description	Responses
neutral/no responses	no response	1
	dont feel anything	2
professional responses	annoyance at lack of publicity for fire service efforts	1
	just another job	3
	feelings of pride working with colleagues and how we handled ourselves	1
	we did it with dignity	1
personal responses	handling bodies didnt bother me	2
	still see images of 'plane very clearly	1
	sadness	2

question were:- discussed with wife and or family (12), discussed with friends (9), discussed with colleagues (5). Most S's had talked it over with more than one group and Table 5.3 shows how often S's had discussed the disaster. 5 S's felt that talking about their experiences had helped them in various ways. It helped one subject to find out the whole 'story' of the incident. Another found that it helped to confirm that he could cope in similar circumstances, whilst another found it helped by knowing that he was not the only one who had felt emotional. 2 S's stated that it had helped to 'exhaust' the incident from their memories and one subject remarked that he was now more appreciative of his fellow workers. Of the 'no' answers to the question, only one subject qualified his answer by stating that 'it only brought back the pain'.

5.4.1.4 Mood Scale

Each mood scale was scored by measuring the distance of the S's mark from the negative pole of each pair of adjectives and allotting scores from 1 - 7 (negative to positive). An overall score for each mood category was derived by summing the scores from each of the three relevant pairs of adjectives. Table 5.4 shows the means for all S's.

A three factor (2x2x5) analysis of variance with repeated measures on the last two factors was computed to examine differences between the two groups (did attend/did not attend the disaster) as a function of mood scale,

TABLE 5.3 VARIOUS ANSWERS BY Ss WHEN ASKED HOW OFTEN THEY HAD DISCUSSED THE DISASTER

How Often	No. of Ss
very little at first	1
for a few days after with family and friends	4
on a couple of occasions	1
not since the disaster	1
occasionally with colleagues	2
regularly with colleagues	1
as and when I wanted	1
regularly with family and friends	1
only now when asked	2

TABLE 5.4 TABLE OF MEANS FOR EACH MOOD CATEGORY FOR BOTH GROUPS (DID/DID NOT GO)

		GENERAL FEELING AT TIME OF SAMPLE	Ss FEELINGS AT THE DISASTER	Ss FEELINGS ABOUT DISASTER NOW
	RELAXATION	6.60	2.90	4.70
	ACTIVATION	5.83	6.60	6.03
DID GO	COMPETENCE	6.46	6.20	6.00
	HAPPINESS	5.60	3.13	3.67
	GOOD NATURE	5.93	4.67	5.33
	RELAXATION	6.00		4.33
	ACTIVATION	6.20		5.53
DID NOT GO	COMPETENCE	6.53		5.83
	HAPPINESS	5.43		2.60
	GOOD NATURE	6.00		4.10

category and time of sample. The ANOVA revealed no significant difference for the group factor. Time and mood category were significant both as main effects and in interaction beyond the $p<.001$ level. Table 5.5 presents the ANOVA summary.

Tests for simple effects were carried out to determine which individual mood categories showed a significant change over time. Table 5.6 shows the summary for these tests. Relaxation and happiness showed a significant ($P<.001$) variation over time together with good nature ($P<.01$) with both groups feeling less happy, less good natured and more anxious when asked how they felt about the disaster at the time of sample.
Although not strictly independent of the analysis above, the opportunity was taken to examine the mood scores of those S's who did attend the disaster including both how they generally felt and how they felt retrospectively about the disaster and how they rated themselves whilst working and handling bodies at the incident. These data were subjected to a two factor (3x5) ANOVA with repeated measures on both factors. The results are summarised in Table 5.7. A test for simple effects on these results (Table 5.8) showed that relaxation and happiness were significant at $p<.001$ level. From these results it appeared that S's who attended the disaster seemed to feel more anxious and unhappy whilst at the incident in comparison to how they felt 8 months later.

TABLE 5.5 ANOVA SUMMARY TABLE FOR GROUPS (DID/DIDNT GO), TIME PERIOD AND MOOD CATEGORIES

SOURCE		SS		DF	MS	F	Sig.
BETWEEN Ss TOTAL	597.825		17				
WITHIN Ss TOTAL	3036		162				
GROUPS		54.45		1	54.45	1.603	NS
GROUPS ERROR		543.375		16	33.961		
MOOD CATS.		660.576		4	165.143	20.943	<0.001
MOOD CAT. ERROR		504.511		64	7.883		
TIME PERIOD		646.005		1	646.005	24.891	<0.001
TIME PERIOD ERROR		415.215		16	25.951		
MOOD X GROUP		26.799		4	6.698	0.848	NS
MOOD X GROUP ERROR		504.511		64	7.883		
MOOD X TIME		244.8		4	61.2	8.291	<0.001
MOOD X TIME ERROR		472.256		64	7.379		
TIME X GROUP		36.45		1	36.45	1.404	NS
TIME X GROUP ERROR		415.215		16	25.951		
TIME X GROUP X MOOD		26.688		4	7.422	1.004	NS
TIM X GRP X MOOD ERR		472.256		64	7.379		
TOTALS	3634.319		179				

(N=18)

TABLE 5.6 SUMMARY TABLE OF SIMPLE EFFECTS OF EACH MOOD STATE ACROSS RESPONSE CATEGORIES FOR DID/DIDNT GO GROUPS

SOURCE	*SS*	*DF*	*MS*	*F*	*Sig*
POOLED ERROR		55.23	10.545		
RELAXATION	261.35	1	261.35	24.8	<0.001
ACTIVATION	4.69	1	4.69	0.44	NS
COMPETENCE	30.198	1	30.198	2.86	NS
HAPPINESS	462.253	1	462.253	43.836	<0.001
GOOD NATURE	132.252	1	132.251	12.54	<0.01

TABLE 5.7 ANOVA SUMMARY TABLE FOR Ss WHO ATTENDED THE DISASTER : FEELINGS BY MOOD CATEGORY (RETROSPECTIVELY & NOW)

SOURCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	447.97		8				
WITHIN Ss TOTAL	2747.996		126				
TIME PERIOD		408.281		2	204.14	10.411	NS
TIME PERIOD ERROR		313.718		16	19.607		
MOOD CATEGORY		788.34		4	197.085	18.423	<0.01
MOOD CAT. ERROR		342.325		32	10.697		
TIME X MOOD		518.459		8	64.807	11.005	<0.01
TIME PERIOD ERROR		376.873		64	5.888		
TOTALS	3195.966		134				

(N=9)

TABLE 5.8 SUMMARY TABLE OF SIMPLE EFFECTS OF MOOD STATE ACROSS RESPONSE CATEGORIES FOR Ss WHO ATTENDED THE DISASTER

SOURCE	*SS*	*DF*	*MS*	*F*	*Sig*
POOLED ERROR		57	12.435		
RELAXATION	544.3	2	272.15	21.885	<0.001
ACTIVATION	26.0	2	13.0	1.045	NS
COMPETENCE	8.0	2	4.0	0.322	NS
HAPPINESS	273.0	2	136.5	10.977	<0.001
GOOD NATURE	65.5	2	32.7	2.635	NS

5.5 Discussion

In terms of the immediate impact effect, every subject was able to offer a description of how they felt at the time and immediately after the disaster and this showed that 11 S's (78%) were clearly affected emotionally (Table 5.1). However, only 8 S's felt that it had affected them in a significant way and that this had manifested itself in different ways, e.g. sleeplessness, anger, inadequacy, etc.

The major cause of stress in S's through handling the bodies was due to the state and number of bodies involved. Experienced firefighters are used to handling bodies but not in the numbers encountered at the disaster and it was therefore not surprising that they felt anxious. Taylor & Frazer (1982) found a similar effect in their study of the Mount Erebus air crash amongst experienced rescue workers and stated that for that group the effects were due to the sheer volume of work they had to carry out within a short time limit.

No subjects felt that they still suffered from any emotional problems or any other effects of attending the disaster although the results of the mood scale analysis showed that S's did feel anxious and unhappy when recalling the incident and some S's still had 'flashbacks' but these did not seem to trouble them particularly.

From Table 5.3, only 3 S's stated that they did not feel anything about the disaster at the time of answering

the questionnaire with one S giving no response at all. It seems incongruous that such a large scale 'once in a lifetime', 'once in a career' disaster should not affect these S's and it may be that they were either using psychological defence mechanisms in order to cope or they were defending against the researcher and the task, a 'mind your own business' feeling. A further look at these S's answers to the questionnaire, although not subjected to a rigorous analysis, did show that 2 S's were clearly upset by the incident and were still having recurring 'flashbacks'. The other gave minimal answers although he did state concern for the relatives of the dead. Of the remainder of the S's, 6 confined their comments to their profession, whilst 5 made personal comments, albeit that within the category of personal response the 'handling of bodies didn't bother me' could be directly related to the professional response category through individual rather that corporate comment. It could be argued that just over half of the subjects still viewed their feelings about the incident through a professional perspective. It may be that this in itself is a psychological defence mechanism or coping strategy enabling those who find themselves in such situations to isolate their personal involvement and feelings.

Individual coping strategies used at the incident were varied but only 5 S's stated that they used some form of strategy based loosely on imagery. All S's felt they

had coped and, as noted above, their emphasis on professional competence seemed to play a part in the coping process. Similar emphasis on professional competence and coping has been found by Ruff & Korchin (1967) in Mercury Astronauts.

There also appeared to be no direct link between age and experience and the degree to which individual coping strategies were adopted. However, it was clear that apart from professional competence, almost all S's took part in some form of talking about their experience at the disaster. It is assumed that because of the emotionality of the incident, most S's felt it necessary to talk it over with their close family. Of the 5 S's who felt that talking about their experience had helped them in various ways, most confined their comments to professional matters, e.g. 'more appreciative of his fellow workers', 'could cope in similar circumstances' etc.

There was some evidence that the 'jigsawing' process was working but surprisingly for an incident of this magnitude, it seemed not to play a major part in the coping process. However, what may have happened is that this process was transposed onto other people that S's came into contact with rather than just their colleagues, as normally the jigsawing process is based on not only talking about the incident in question, but also on past similar experiences. There were no such similar experiences to 'anchor' on in this case.

Another factor which could have affected the jigsawing process was that crews who attended the disaster returned to their respective fire stations and went immediately off duty. This was due to them working over the normal end of shift. In this case, the crews would not have time to sit down and reconstruct the incident between themselves. Therefore, a major part of the 'jigsawing' process was not concluded. This could also be a reason why so many S's discussed the incident with family and friends. This factor may have had a significant effect on the length of time it took some S's to eventually cope with the event without the immediate group interaction.

The analysis of mood scale scores showed that competence and activation were not affected significantly, each one showing a high mean score across the response categories. Of the S's who attended, happiness and relaxation were affected significantly, although there was some move towards the positive pole of each of these mood categories at the time of sample, indicating that coping or coming to terms with such an experience takes time.

The comparison group was used firstly to provide a comparison of baseline measures of general feeling of mood categories at the time of sample. There was no significant differences between this group and the experimental group on these baseline measures showing that the two groups were a representative sample. Secondly,

the comparison group provided data of how they felt about the disaster at the time of sample and this was compared with the similar data of the group who did attend. The analysis of this data would show if attendance at this disaster had a significant effect on reported mood and whether there were significant differences between the groups because of experiencing the disaster at 'first hand'.

Interestingly, the results showed no significant differences between the two groups. The general feelings of mood for the baseline measures between the two groups were similar making them a representative sample. Also, there were no significant differences between the two groups when asked to report how they felt about the disaster at the time of sample. This effect could be due to some form of 'professional empathy' where the comparison group felt the same about the disaster purely because they 'felt' it in the same way as those who did attend. It could also have been due to 'cross talk' where the experience of those who attended had been passed on and transfixed onto others. A further explanation of this result may be that the comparison group knew that it could have been them that were there and they would therefore have needed to come to terms with the thought of it. The significant mood categories in the analysis of both groups scores showed that all S's felt anxious, unhappy and less good natured about the disaster.

5.6 Conclusion

The results of this study showed that post-disaster stress is a complex interaction of individual emotions, professional competency, overt and covert coping strategies, group relationships and probably many more factors that have not yet been recognised or defined, although the overall effect in this case was fairly slight.

The Manchester International Airport Disaster provided an opportunity to apply two methodological approaches which had been used in the previous two chapters and compare the findings with similar studies using different methodologies by Duckworth (1986) and Taylor & Frazer (1982).

It is clear that the complexity of the interaction of all the factors cited by them is confirmed in the present study. Where the studies seem to conflict is in the management and follow up (de-brief) procedures. It is suggested by the present study that, for firefighters, talking through and about the experience with people, especially colleagues, is in itself a form of de-brief (the 'jigsawing' effect) which acts as a coping strategy. The emphasis on work colleagues may be important here as in the fire service, they form a cohesive unit or group, used to working with each other in different situations and environments over long periods of time. The groups formed for the Mount Erebus aircrash were brought together

as teams just for that incident and the group cohesiveness may not have been sufficient to allow the intimate process of 'jigsawing' to take full effect.

Duckworth (1986, 1987) and Taylor & Frazer (1982) identified and defined disaster stress, its manifestations and resultants and suggested ways to reduce this stress and anxiety. Taylor & Frazer also suggested that there would be merit in recruiting a heterogeneous collection of health professionals for future clinical and research assignments in disaster situations. The present study suggests that rather than recruiting researchers to study disaster stress, groups of disaster workers should be recruited and trained together and be able to respond to any disasters as a supplemental force. Such groups of disaster workers would form cohesive units and it is suggested that the occurrence of the 'jigsawing' effect that has been found in firefighters would also become a part of these groups activities. In this way, stress and anxiety may be reduced at its source, rather than researched as an inevitable outcome of any disaster.

CHAPTER 6

6 FIREFIGHTERS AT WORK : SITUATIONS, REACTIONS AND INTERACTIONS : A CROSS-SECTIONAL STUDY WITHIN AN INTERACTIONIST PARADIGM

6.1 Introduction

The studies in Chapters 3 & 4 highlighted periods during the working day and situations which experienced firefighters found themselves in stressful, i.e. anxiety provoking situations. These studies also highlighted those situations which appeared to be anxiety reducing. It was found that there was a need for a comparison of less and more experienced firefighters in a cross-sectional study.

The analysis by mood categories looked specifically at experienced firefighters attending emergency calls and showed that there was a significant interaction effect between the mood categories and the stages of those emergency situations including baseline measures. This seemed to suggest that there may be strength in the interactionist position that behaviour is determined interactionally between situations and individual responses.

The interactionist position has been born out of studies which have concentrated on personality and personality traits as the major determinants of behaviour and where situations have been used only as experimental

stimuli. The traits exhibited, which were consistent across situations, were therefore seen as the major determinants of behaviour and this was the position stated by personologists and others (Cattell & Scheier, 1961; Rapaport, Gill & Schafer, 1945). On the other hand, social psychologists have insisted that situations and their perception were the basic determinants of behaviour. The issues were therefore cross-situational consistency and persons versus situations (situational specificity).

These issues have been investigated by the use of different research strategies, the major ones being:-

i) multidimensional variance components;

ii) correlational research; and

iii) personality x treatment factorial experimental design.

6.1.1 Multidimensional Variance Components Strategy

The multidimensional variance components strategy was used by various researchers (Argyle & Little, 1972; Bowers, 1973; Endler, Hunt & Rosenstein, 1962; Endler & Hunt, 1968; Endler & Okada, 1975; Moos, 1968; 1969) to investigate various aspects of personality traits, e.g. hostility, anxiety, honesty, conforming behaviour, social perception, etc., and to provide an indirect test of cross situational consistency. All of their separate findings provided sufficient evidence to support the interactional and multidimensional phenomenon that runs through and across personality variables, subject samples and

situations. This phenomenon was the overwhelming evidence that the variance which accounted for the person x situation interaction was more important than the variance due to persons and situations per se.

6.1.2 Correlational Research Strategy

Correlational Research provided the direct test of cross-situational consistency. Various studies (Endler & Magnusson, 1976,(a); Endler & Okada, 1975; Magnusson & Heffler, 1969; Magnusson, Heffler & Nyman, 1968; Nelson, Gruder & Mutterer, 1969) have found no support for the personality trait theory of trans-situational or cross-situational *consistency*.

6.1.3 Personality x Treatment Factorial Experimental Design

The variance component studies described the interactions and the correlation studies showed either consistency or lack of it but neither showed how persons and situations interacted and why those interactions were important in eliciting specific behaviour or responses. A number of personality and treatment experimental design studies were carried out in the 1970's relating to various personality variables (Cronbach & Snow, 1977; Domino, 1971; Fielder, 1977) and again they showed empirical support for the person by situation position.

In evaluating the trait stability hypothesis (cross-situational consistency), the general personality coefficients have ranged from .20 to .50 with a mean of

.30 (Endler, 1973; Mischel, 1968). The empirical results of consistency (or stability) have averaged correlation coefficients of .30 (Endler, 1980) using personality constructs which were non-cognitive. These coefficients only accounted for 9% of the relevant variance and, as Endler (1980) suggests, they point to the limitations of the trait stability hypothesis for explaining and predicting behaviour in actual situations.

There have been studies of the cognitive features of personality vis a vis situations and those have shown some evidence to support cross-situational and longitudinal consistency (Mischel, 1968; Rushton & Endler, 1977).

6.1.4 The Situation, the Individual and the Environment

Greater consistency can be predicted where situations are familiar and expected. Consistency can also be thought of as a longitudinal factor in those situations that are continually encountered throughout life. These types of situations can be selected by the individual and habituated to ensure consistency. Where situations are not habituated (they are new or have not or rarely been experienced in the past) or are imposed on the individual, then inconsistency is found, even when cognitive variables are employed in conjunction with personality factors. This is shown in the studies of Caplan, Cobb, French, Van Harrison & Pinneau (1975), Caplan & Jones (1975), and Kahn, Wolfe, Quinn, Snoek & Rosenthal (1964), who have all found inconsistencies and differences between personality

types and the way these have reacted to situations. The latter two studies used Type A behaviour. Keenan & McBain (1979) also used Type A behaviour and found similar differences, but like Caplan & Jones (1975) they concentrated on the measuring of the concepts of role ambiguity, workload, role conflict, etc., and their relationships with cognitive concepts. Those concepts included role stress, psychological strain, anxiety, depression and resentment. Responses as a function of the person and the situation/environment together were not considered in these studies. So far, a large amount has been said about the role of the individual's personality and person variables in studies of stress and anxiety and clearly a person's experience of the world and perception of it must play a crucial role in determining how that individual reacts to any situation and how the two interact.

Many major sources of anxiety in individuals are a product of that individual's history of adaptation and coping with situations and similarly, situational sources of anxiety are produced by individual uncertainty and unfamiliarity with a situation. Most of the consistency in behaviour can therefore be said to be due to habituation when interacting with familiar situations or by the experience that an individual brings to unfamiliar situations and the employment of coping strategies which reduce anxiety. Magnusson (1978) believes that the

environment influences individual development and behaviour but that the environment is itself mediated by the actual situations. A number of researchers have commented on and attempted to define the terms environment and situation and relate their role in determining behaviour (Ekehammer, 1974; Endler, 1977; Magnusson, 1976; Moos, 1973; Pervin, 1978).

Feshbach (1978) delineated two levels of the environment of personality. Firstly, the situational level and secondly, the sociocultural. According to Feshbach, the situational level provides empirical data from the immediate social and physical environment of the organism for the situational specificity versus the cross-situational consistency debate. The second classification of Feshbach refers to the broader social cultural and physical context including anticipatory socialisation, where the picture an individual has of the environment, profession etc. before experiencing it, provides situations with their meanings as reconstructed and reproduced by the individual. It therefore provides the frame of reference of how these situations are perceived.

Classifications and distinctions similar to Feshbach's have been made in which there is a subjective or physical aspect of an environment or situation (Ekehammar, 1974; Endler & Magnusson, 1976(a), 1976(b); Magnusson, 1978; Pervin, 1978). These distinctions are not new (see Kantor, 1926; Koffa, 1935; Murray, 1938) and

the conceptual differences are such that the objective aspect is the environment as the individual actually perceives it and makes sense of it. These two distinctions form a common theme that runs both through psychology and sociology:- see Berger & Luckman (1967) for their discussion on society and the perception of it as both subjective and objective reality.

6.1.5 Investigating Situations

A number of researchers (Ekehammer, 1974; Endler & Magnusson, 1976 (a&b); Magnusson, 1971 and 1974) distinguished two major features or components for investigating situations whether it be a reaction to a specific situation or the total environment, and these were:-

i) situation perception

ii) situation reaction

These researchers felt that the perception of a situation by an individual was an essential factor in determining the behaviour evoked and therefore it was necessary to study how people responded to those situations in order to attempt to classify similarities in behaviour.

Frederikson (1972) and Rotter (1954) have suggested that there could be a taxonomy of situations defined by the similarity of reactions that they elicit in individuals. Many of the studies using the situation reaction paradigm have used inventories compiled

specifically for this research:- S.R. (Situation - Response) Inventory of Anxiousness (Endler, Hunt & Rosenstein, 1962), Interactional Reactions Questionnaire (Ekehammer, Magnusson & Ricklander, 1974) and the Stressful Situations Questionnaire (Hodges & Felling, 1970). Magnusson & Ekehammar (1975, 1978) used situation reaction data from various studies in comparisons and concluded that congruence coefficients were such that an interaction model of personality could be postulated.

Endler (1980) has pointed out that it is important to differentiate between the situation perception dimensions and the situation reaction dimensions. An identical situation may be perceived differently by two different people and they may also react differently. Also, they may react differently to the same situation if they encountered it again, this aspect is a temporal one and it is important to note that all situations can be multidimensional and multifaceted.

6.2 The Study of Anxiety

6.2.1 Trait and State Anxiety

In the past, studies of anxiety have concentrated on the distinction between trait anxiety and state anxiety originally identified by Cattell & Scheier (1958, 1961) and refined by Spielberger (1966, 1972, 1975) who suggested that there was a failure in anxiety studies to distinguish between the two. Trait anxiety (A-Trait) can be described as the relatively stable individual

differences to anxiety proneness which vary greatly from one situation to another. State anxiety (A-State) can be described as an emotional reaction which is transitory in effect and varies over time due to differing stresses placed on the individual and can therefore be seen to be situationally based and driven.

Most studies within the State-Trait anxiety theory have investigated anxiety only in ego-threat and physical-threat conditions or situations. Hodges (1968), Spielberger, Gorsuch & Lushene (1970) and Rappaport & Katkin (1972) have all used Taylor's (1953) Manifest Anxiety Scale or the State-Trait Anxiety Inventory of Spielberger et al (1970) which are both unidimensional and restrict measures to interpersonal A-Traits ignoring other facets of 'trait' anxiety and 'state' anxiety.

6.2.2 Interactionist Model of Anxiety

Endler, Hunt & Rosenstein (1962) found three situational factors related to anxiety and their S-R Inventory of Anxiousness started a rationale which led to the multidimensional interaction model of anxiety proposed by Endler (1975).

Endler & Hunt (1969) first proposed an interactionist model of anxiety after their findings that the percentage of variance attributed to both situations and individual differences was small in contrast to the interaction between persons and situations which contributed more of the variance than either of the main effects. Moos (1968,

1969) also found that the person-by-situation variance was more important than the variance due to persons. Endler (1973) asked the question 'How do persons and situations interact in determining behaviour?' which has a relevance for personality research and theory but it is more pertinent to anxiety research, especially an interactionist model with its multidimensional nature. McGrath (1976) had also stated that behaviour in an organisation can be due to the physical and social environment and the person and that it was the combination of all the interactions which determined the overall stress level.

Lazzerini, Cox & Mackay (1979) replicated a paper by Magnusson & Ekehammer (1975) and proposed a general anxiety trait. They suggested the retention of traits as a valid concept in relation to self-reported anxiety as evidence was found in their replication work which pointed to a general trait of such anxiety. This general trait was independent of situational influences and accounted for 50% of the variance for S's responses. However, they did recognise that if the existence of situational factors, or the refutation of traits was to be demonstrated reliably, then data must be gathered from real situations.

6.3 The Study of Stress and Anxiety in Occupational and Work Settings

Most of the studies quoted above have not been used

to study true work/occupational settings and situations. Also, they have only used a relatively small list of situations to respond to. Redfield & Stone (1979) used 44 events with 6 bipolar scales to determine individual viewpoints on stressful life events. They concluded that different individuals determined their own reactions to anxiety provoking events according to their characteristics and therefore rated those events in different ways indicating that such ratings were multidimensional as well as person specific. Similarly Koch, Gmelch, Tung & Swent (1982) sought to develop a perceived job-related stress scale using a situationally based questionnaire that would reflect the multidimensional nature of stress and used it on an homogenous occupational group. Their study also investigated the relationship between subjectively experienced stress and certain characteristics of the subjects, e.g. age, years of job experience, position and physical health. Koch et al (1982) concluded that there was sufficient evidence to develop survey scales that captured the multidimensionality of perceived job-related stress in specific occupational settings. These would alllow maximum discrimination with some loss of comparability and generality which would ensue from using general dimensions of stress. Chapter 3 outlined a number of studies which used in their model of occupational stress the assumption that:-

i) there would be specific events more likely to cause stress than others,

ii) they were occupationally specific; and

iii) they therefore needed empirically identifying for different jobs.

Using a 45 event scale identified through discussions and questionnaires with groups of medical nurses, Motowidlo et al concluded that the events were caused jointly by conditions of the job setting and the personal characteristics of individuals who reacted in ways that precipitated them.

Although Motowidlo et al's study is different from the Redfield & Stone (1979) and Koch et al (1982) studies, and also others cited above, in that events or situations are seen as the outcome rather than the fixed causal feature, their results from this different perspective adds even more weight to the multidimensionality theory.

Payne et al (1982) stated in their study of the measurement of anxiety at work that the S-R format enabled researchers to study the interactionist approach to work situations closely by looking separately at each two-way interaction between the person, the situation and the mode of response. Also, more sensitive measures of work anxiety could be achieved by clearer discriminations between the determinants of outcome status. The ecological validity of the measures was also higher when used in true work situations rather than simple trait

measures because reactions would be more relevant to the individual familiar with the work situation.

Payne et al also stated, citing Golding (1975) and Olweus (1977) that simple comparisons between variance components similar to those of Endler & Hunt (1969) could not be definitive mainly due to the fact that the size of the variance components reflected the heterogeneity of the sampling of each effect which was controlled by the researcher. This led to low situation variance when the number of situations used was small and low subject variance when the subjects sampled were from similar backgrounds.

Olweus (1977) has argued that interactions which account for large proportions of variance cannot in themselves lead to a conclusion that behaviour is a function of interaction in a general sense. It is important to determine how the variables interact, and where these interactions are sizeable, it should also be important to try and discover regularities in the interaction patterns. This could be done by the use of multivariate classification procedures or the use of other data about the subjects to sort them into homogenous sub groups with relevant characterstics.

6.3.1 The Job Reaction Questionnaire (JRQ)

Payne et al (1982) found support for the interactionist position using a job reaction questionnaire (JRQ) containing 20 work situations and eight

psychological and emotional response modes. The situations chosen for the JRQ were selected to span a range from the workplace and which would be seen as potentially anxiety provoking to some degree whilst the responses were a subset of those used by Endler & Hunt. The subjects used included managers, supervisors, teachers and self-employed entrepreneurs.

By the use of multidimensional scaling, Payne et al found that the person by situation interaction clustered into routine work situations, in-role sources of anxiety and personal sources of anxiety. The person by reaction interaction clustered into emotional, autonomic and wish-to-avoid categories and the situation by reaction interaction into less common stress responses eliciting emotional arousal or wish-to-avoid responses.

They also found that experiencing a situation had a generally small effect on anxiousness, and there was a difference between those situations which had been experienced and those that had not. The difference was significant in the tendency to report experienced situations as less anxiety provoking.

Payne et al's support for the interactionist position was shown by their findings that where the two-factor interactions were sizeable, meaningful patterns could be discerned using multivariate analysis and with the interaction of situations and response modes, the patterns existed independently of individual differences. The

third hypothesis that they tested with regard to the effect of experiencing a situation on the strength of reaction tended to indicate that the less a situation was experienced, the more anxiety provoking it was although their results were equivocal.

6.4 The Study of Anxiety in Experienced Firefighters

The present study used firefighters from different fire brigades throughout the United Kingdom. It was thought that, unlike the Payne et al study, the use of one occupational group would give homogeneity to the sample and yet there would be sufficient heterogeneity introduced into it by the differing lengths of experience of the firefighters both in terms of training and operational expertise, the different brigades in which they served, their age, rank and behaviour (Type'A'). Firstly, it was hoped that this heterogeneity would provide results to the study's hypothesis which would reflect the multi-dimensionality of anxiety within a fire service context giving maximum discrimination in perceived occupationally based anxiety and explore the relationships between the anxiety experienced throughout the various situations and the characteristics of the individuals. Secondly, it was hoped that the situations themselves would group themselves according to the degree that they provoked anxiety and thirdly, that the homogeneity of the subject sample would prove that the perception of situations was general across the occupational group.

To ensure that this type of analysis could be achieved, an interactionist approach seemed appropriate and following Payne et al's (1982) example, based on the model of anxiety of Endler & Hunt (1969), an adaptation of Payne et al's Job Reaction Questionnaire was devised to give face validity to the measure of anxiety in the reactions related directly to relevant aspects of the work situation.

6.5 Method

6.5.1 Subjects

The subject sample was composed of 200 male firefighters varying in rank from firefighter to Station Officer serving in six different fire brigades in England.

These brigades varied in size from rural through to Metropolitan which would give a greater spread of variety in the professional experiences of the subjects. The subject age range was between 22 and 49 years of age and the length of service in the fire brigade varied from 1 to 27 years. For the purpose of statistical analyses, the subjects were classified into the following experienced groups:-

i) Group 1, up to 5 years service

ii) Group 2, between 5 and 10 years service

iii) Group 3, between 10 and 15 years service

iv) Group 4, between 15 and 20 years service

v) Group 5, over 20 years service.

21.5% of the subjects held an Officer rank (Leading

Firefighter, Sub Officer or Station Officer).

6.5.2 Data Gathering Methodology

The data was gathered over a period of 12 months. No major difficulties were experienced in the distibution of the data and its prompt return. The return rate was 100% probably due to the organisation and efficiency of the coordinators who were all fire service officers.

The design of the study used a cross-sectional survey approach sampling the subjects once with a Fire Service Job Reaction Questionnaire. This produced the cross-sectional or 'time-slice' data.

6.5.2.1 Fire Service Job Reaction Questionnaire (FSJRQ)

This was the main method of measurement where subjects would report their strength of both physiological and emotional reactions on a scale of 8 response dimensions to 23 situations encountered in fire service work (an 8 x 23 matrix). The situations all concerned work settings and were selected from the previous chapters where results had suggested the likely times that anxiety, coping and the strategies for coping would occur.

The reactions were similar to those used by Endler & Hunt (1969) and Payne at al (1982) using physiological and emotional reactions. Because of the very nature of a firefighter's job, some of the physiological reactions were inappropriate, e.g. I perspire a lot, and other reactions were used, i.e. annoyance and nervousness.

Subjects were asked to respond to the 23 x 8

matrix using a five point scale indicating their strength of reaction to each situation in turn, i.e. working down the columns of the FSJRQ.

Part of the FSJRQ also contained a column for subjects to report whether they had previously experienced each situation listed and if not, they were asked to judge how they thought they would respond to that situation. Appendix 6 shows a sample FSJRQ.

Subjects were also asked to state their name, age, rank and length of service on the FSJRQ on a voluntary basis. Approximately 80% of subjects supplied all or part of this information.

Tables 6.1 and 6.2 list the situations and reactions together with the mean scores for all the sample. Figures 6.1 and 6.2 show graphically both sets of mean scores.

6.5.2.2 Type A Behaviour Questionnaire.

32% of subjects were close enough geographically to carry out further data gathering and were asked to complete a Type A behaviour questionnaire as well as the FSJRQ. The Type A/B behaviour questionnaire chosen contained 14 bipolar (contrasting) statements (e.g. never rushed vs always feel rushed) with a scale using a central zero to 5 at each pole. Subjects were asked to circle one number which best corresponded to their behaviour for each pair of statements. Appendix 7 shows an example of the Type A Behaviour questionnaire used.

TABLE 6.1 SITUATION MEAN SCORES FOR THE FIRE SERVICE JOB REACTION QUESTIONNAIRE

SITUATIONS	MEAN SCORES
1 coming off duty	1.256
2 arriving home after a busy shift	1.332
3 having performance watched by senior officer	2.434
4 interviewed by senior officer	2.466
5 making mistakes on drill in front of colleagues	2.459
6 participating in drills	1.578
7 participating in an exercise	1.764
8 the bells 'going down' on station	1.833
9 travelling as a crew member to an incident	1.651
10 arrival at a fire	1.771
11 arrival at a special service call with persons trapped	2.139
12 arrival at a 'persons reported' fire	2.309
13 getting to work at an incident	1.685
14 colleagues pointing a mistake out you have made at an incident	2.384
15 being involved in clearing up and damping down operations	1.552
16 thinking about an incident you have just been to	1.349
17 talking amongst your colleagues back at the station about an incident you have just attended	1.294
18 talking amongst colleagues about past incidents	1.247
19 being unsure of a piece of equipment	2.41
20 being in a dangerous situation	2.831
21 participating in watch pranks	1.666
22 standing round talking on the fireground about your experiences immediately after the incident	1.457
23 having to perform repetitious drills	2.016

(N=200)

TABLE 6.2 REACTION MEAN SCORES FOR THE FIRE SERVICE JOB REACTION QUESTIONNAIRE

REACTIONS	MEAN SCORES
1 my heart beats faster	2.243
2 I feel inadequate	1.592
3 I want to get out of the situation	2.188
4 I get annoyed	1.929
5 I feel very nervous	1.867
6 I feel queasy in my stomach	1.659
7 I feel tense	1.943
8 my emotions interfere with what I am doing	1.497

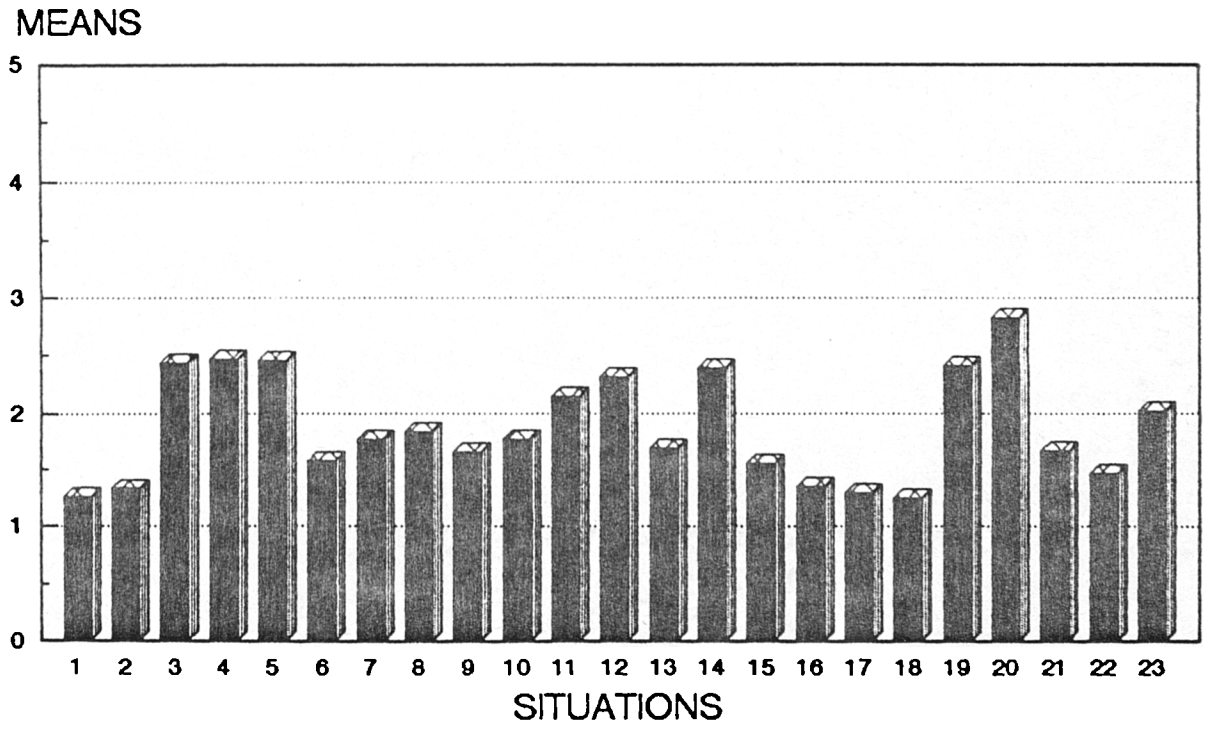
(N=200)

FIGURE 6.1 CHART OF SITUATION MEAN SCORES FOR FIRE SERVICE JOB REACTION QUESTIONNAIRE

KEY

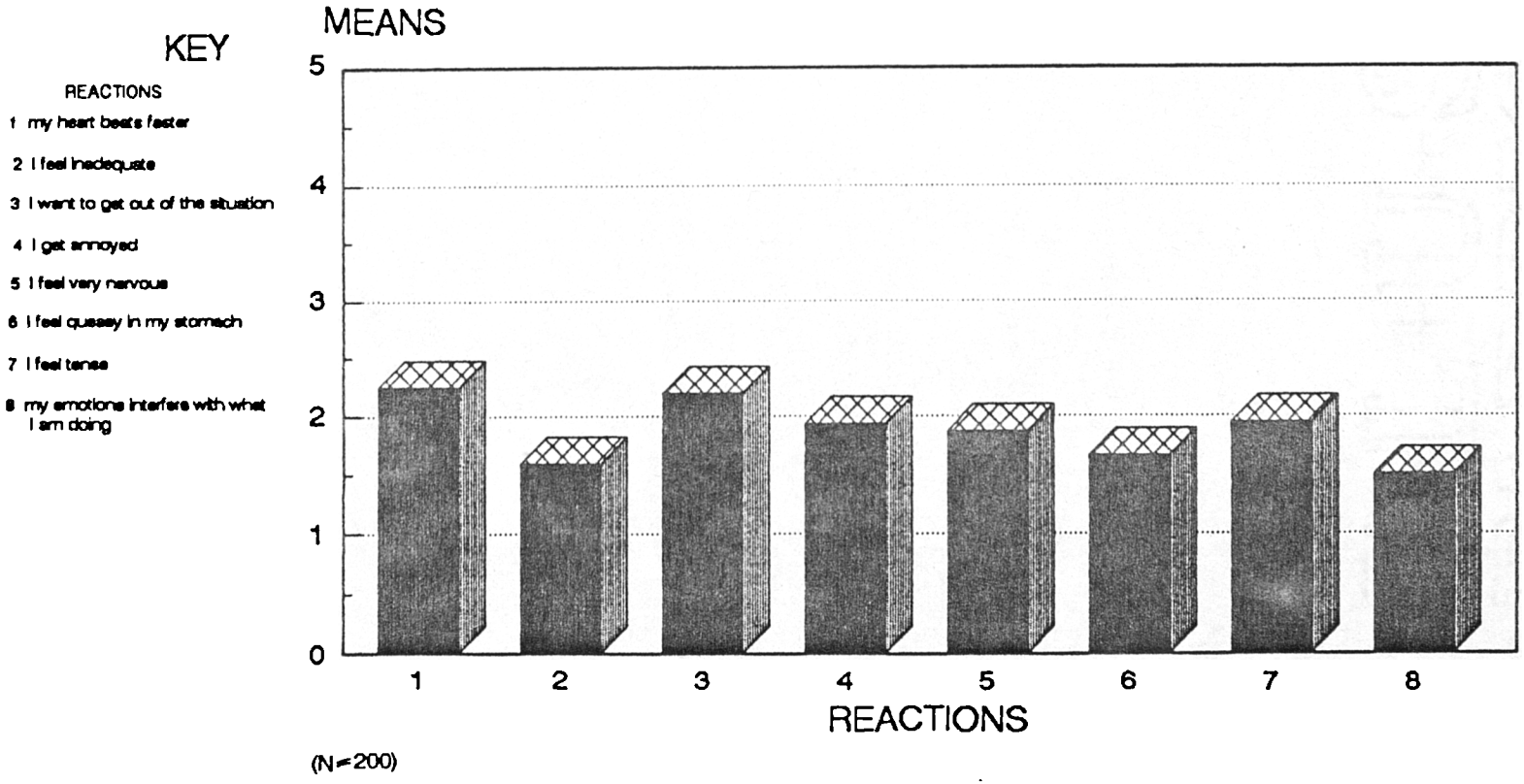
SITUATIONS

1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
5 making mistakes on drill in front of colleagues
6 participating in drills
7 participating in an exercise
8 the bells "going down" on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at a special service call with persons trapped
12 arrival at a "persons reported" fire
13 getting to work at an incident
14 colleagues pointing a mistake out you have made at an incident
15 being involved in clearing up and damping down operations
16 thinking about an incident you have just been to
17 talking amongst your colleagues back at the station about an incident you have just attended
18 talking amongst colleagues about past incidents
19 being unsure of a piece of equipment
20 being in a dangerous situation
21 participating in watch pranks
22 standing round talking on the fireground about your experiences immediately after the incident
23 having to perform repetitious drills



(N=200)

FIGURE 6.2 CHART OF REACTION MEAN SCORES FOR FIRE SERVICE JOB REACTION QUESTIONNAIRE



6.5.2.3 Sickness Data

Sickness record information for the previous 2 years was obtained for the 32% of subjects who completed the Type A questionnaire and FSJRQ. All illnesses, whether certificated by a medical practitioner or not, that any subject had reported were totalled in terms of the number of days lost. Injuries were not included in the total.

6.5.3 Procedure

All subjects were given their questionnaire(s) for self completion whilst they were at work and they were immediately returned to the nominated co-ordinator for the relevant brigade.

6.6 Hypotheses

The design of the study, together with the literature search of the subject suggested that a number of hypotheses should be generated. The multi-methodological statistical analysis approach to the data would ensure that each hypothesis would be tested by at least one of the statistical methods used.

The detailed hypotheses postulated where:-

6.6.1 Hypothesis 1

There will be specific situations that will be more likely to cause anxiety than others and as Frederikson (1972) and Rotter (1954) have suggested, a taxonomy of situations which elicit the same types of reactions in individuals should emerge.

6.6.2 Hypothesis 2

If the interactionist position is correct then the total variance of the interaction effects should be sizeable and similar to Endler & Hunt's (1969) summary and Payne et al's (1982) study. This effect may be caused by each S reacting to each situation individually. However, if the subject main effect accounts for less variance than Payne et al's study then this may point to group homogeneity rather than individuality of reactions. If this occurs, then the subject main effect will be similar to Endler and Hunt's summary. The percentage of variance due to the situation main effect should be similar to Payne et al's study as the situations chosen spanned a wide range of work activities and the strength of reaction main effect should be lower than that study because of the occupational specificity of the group.

6.6.3 Hypothesis 3

If there are sizeable interaction effects as postulated by hypothesis 2 and there is an emergent homogeneity of the subject sample which means that they may react to situations in similar ways, with no clear patterns appearing for individuals, then meaningful and discernible patterns should emerge between the interaction of situations and reactions.

6.6.4 Hypothesis 4

The subject sample should show group homogeneity and firefighters as an occupational group will perceive

situations similarly (situational specificity) rather than perceive them as individuals (cross-situational consistency) characterised by personality variables.

6.6.5 Hypothesis 5

Experience in terms of years of service, past experience and training to deal with the situations will affect S's strength of reactions to those situations increasing homogeneity.

6.6.6 Hypothesis 6

Those S's who exhibit Type A behaviour will feel more anxious when experiencing stressful situations.

6.6.7 Hypothesis 7

Type A behaviour is a fixed characteristic which should not correlate significantly with age, experience or rank.

6.6.8 Hypothesis 8

Sickness and rank are both associated with Type A behaviour and should therefore correlate positively with it.

6.6.9 Hypothesis 9

Officers, who are the people who occupy boundary spanning positions, will perceive and experience some situations differently from firefighters.

6.6.10 Hypothesis 10

Episodic events e.g. fires and special services will be less anxiety provoking than some chronic ongoing

situations which Lazarus et al (1983) term 'daily hassles' e.g. being assessed or interviewed by a senior officer, making mistakes in front of colleagues.

6.7 Statistical Analyses

All statistical analyses were carried out using SPSSx.

6.7.1 Correlations

For all correlations, the Pearson product-moment correlation was used with two tailed significance levels being specified for each correlation.

6.7.2 One Way Analysis of Variance

The one way analysis of variance model (ONE WAY) used by SPSSx produces one way analysis of variance for an interval level variance by one independant variable. This means that the model can analyse several dependent variables by one independent variable. The ONE WAY model was used so that orthogonal tests could be carried out on the results. The orthogonal and a posteriori test used with the one way analysis of variance was the Scheffe test which gave table ranges for the $p<0.05$ level and classified groups in pairs that were significantly different at the $p<0.05$ level.

6.7.3 Factor Analysis

The factor analysis module of SPSSx produces both a principle component analysis for initial extraction and rotation to a final solution. The principle component

analysis extracts n factors and produces a factor matrix with final statistics of communality for all the variables. For the n factors extracted, it provides the Eigenvalue, percentage of variance and the cumulative percentage of variance, and then uses an iterative routine of Varimax rotation with Kaiser normalization to produce the final rotated factor matrix.

6.7.4 Multivariate Analysis of Variance (MANOVA)

The SPSSx MANOVA uses a generalised multivariate analysis of variance which can be used with a univariate approach. The univariate analysis was carried out on a within subject repeated measure design (200 x 23 x 8 matrix) with averaged tests of significance using unique sums of squares.

6.7.5 Multidimensional Scaling (ALSCAL)

The model was ALSCAL which uses matrices of proximities as its input data. ALSCAL uses an alternating least-squares approach in a Euclidean distance model and produces a Euclidean dissimilarity coefficient matrix. As the analysis proceeds, the change in S-STRESS is shown by an iteration history for an n dimensional solution using Young's S-STRESS formula. The iterations stop when S-STRESS improvement is less than 0.001 or the maximum of 30 iterations is exceeded. Both STRESS and square correlations (RSQ) are calculated on distances. These STRESS values are Kruskal's stress formula 1 obtained from

the square root of the proportion of total sums of squares of the optimally scaled data that is not accounted for by the model. The overall stress is the root mean square of these individual stress values. The RSQ values are the proportion of variance of the scaled data and the overall RSQ is the average of the individual RSQ values. As RSQ has a straightforward interpretation (Schiffman, Lance Reynolds & Young, 1981) the output solution is a stimulus configuration plot in n dimensions together with plots of linear and non linear fits and transfigurations.

6.8 Results

6.8.1 Mean Scores and Correlations of Situations, Reactions, Rank, Experience, Sickness, Age and Type A Behaviour

Tables 6.1 and 6.2 showed the FSJRQ means scores for situations and reactions respectively. Table 6.3 shows the intercorrelations for situations. All the inter-correlations for situations were positive and significant (with the exception of situation 2 and 20) at either the $p<.001$, .01 or .05 levels, with the overwhelming majority being at the $p<.001$ and beyond level (two tailed). Table 6.4 shows the same intercorrelational patterning and significant results for reactions. These results confirmed that there was consistency amongst S's, independent of age, brigade, experience etc., in the degree of extremity of their reactions to situations.

TABLE 6.3 TABLE OF INTERCORRELATIONS OF SITUATIONS

	SITUATION 1	SITUATION 2	SITUATION 3	SITUATION 4	SITUATION 5	SITUATION 6	SITUATION 7	SITUATION 8
SITUATION 1		0.4432	0.4597	0.4100	0.3683	0.5019	0.5074	0.3056
SITUATION 2			0.3868	0.2938	0.2386	0.4244	0.3673	0.3396
SITUATION 3				0.7488	0.5188	0.5314	0.5878	0.4004
SITUATION 4					0.4196	0.4528	0.5290	0.4208
SITUATION 5						0.5059	0.4898	0.3340
SITUATION 6							0.7327	0.5492
SITUATION 7								0.5546
SITUATION 8								
SITUATION 9								
SITUATION 10								
SITUATION 11								
SITUATION 12								
SITUATION 13								
SITUATION 14								
SITUATION 15								
SITUATION 16								
SITUATION 17								
SITUATION 18								
SITUATION 19								
SITUATION 20								
SITUATION 21								
SITUATION 22								

(N=200)
All intercorrelations $p<0.001$ except :-
* $p<0.01$, ** $p<0.05$, + not significant

TABLE 6.3 CONTINUED (SHEET 2)

	SITUATION 9	SITUATION 10	SITUATION 11	SITUATION 12	SITUATION 13	SITUATION 14	SITUATION 15	SITUATION 16
SITUATION 1	0.3640	0.3268	0.1272	0.2183	0.3310	0.2666	0.4123**	0.3078*
SITUATION 2	0.3613	0.3638	0.1903	0.2217	0.3706	0.2941	0.2298	0.3668*
SITUATION 3	0.4978	0.4807	0.4038	0.4611	0.4684	0.4088	0.3118	0.2820
SITUATION 4	0.5099	0.4643	0.3563	0.4408	0.4370	0.3639	0.3661	0.2953
SITUATION 5	0.3263	0.4545	0.3049	0.3223	0.4133	0.7218	0.3133	0.2926
SITUATION 6	0.5643	0.5912	0.3873	0.4290	0.5660	0.4095	0.4923	0.4906
SITUATION 7	0.5301	0.5401	0.4475	0.5060	0.5478	0.4780	0.4603	0.4625
SITUATION 8	0.7978	0.7449	0.5178	0.5436	0.5681	0.3834	0.4417	0.5803
SITUATION 9		0.7740	0.5594	0.5974	0.7496	0.4263	0.5326	0.5643
SITUATION 10			0.5152	0.5699	0.7693	0.4969	0.3661	0.5041
SITUATION 11				0.5290	0.5116	0.4140	0.2983	0.4056
SITUATION 12					0.5356	0.3963	0.2832	0.4351
SITUATION 13						0.5439	0.4590	0.5053
SITUATION 14							0.4236	0.4892
SITUATION 15								0.5613
SITUATION 16								
SITUATION 17								
SITUATION 18								
SITUATION 19								
SITUATION 20								
SITUATION 21								
SITUATION 22								

(N=200)
All intercorrelations $p<0.001$ except :-
* $p<0.01$, ** $p<0.05$, + not significant

TABLE 6.3 CONTINUED (SHEET 3)

	SITUATION 17	SITUATION 18	SITUATION 19	SITUATION 20	SITUATION 21	SITUATION 22	SITUATION 23
SITUATION 1	0.3980	0.3382	0.2674	0.1830*	0.2920	0.3161	0.2163*
SITUATION 2	0.3426	0.3630	0.2464	0.1087+	0.3049	0.3419	0.3056
SITUATION 3	0.2169	0.2186	0.3604	0.4108	0.2997	0.3378	0.4221
SITUATION 4	0.3418	0.2714	0.2661	0.3747	0.2994	0.3938	0.3263
SITUATION 5	0.2961	0.3067	0.5674	0.3067	0.4162	0.3310	0.3162
SITUATION 6	0.4496	0.4298	0.3625	0.3497	0.3345	0.4959	0.4496
SITUATION 7	0.4119	0.3734	0.3752	0.4068	0.2957	0.4548	0.5032
SITUATION 8	0.4419	0.4713	0.3550	0.4661	0.2387	0.4378	0.3954
SITUATION 9	0.5112	0.4803	0.3149	0.4340	0.2221*	0.5233	0.4366
SITUATION 10	0.4241	0.4306	0.3781	0.5034	0.1649**	0.4671	0.4212
SITUATION 11	0.2998	0.2997	0.3748	0.4329	0.2038	0.3148	0.2946
SITUATION 12	0.3294	0.3643	0.3501	0.5400	0.1594**	0.3828	0.3179
SITUATION 13	0.6508	0.4988	0.4468	0.4631	0.2762	0.5717	0.4612
SITUATION 14	0.3838	0.2978	0.5700	0.4348	0.4479	0.3960	0.4302
SITUATION 15	0.5119	0.4584	0.4262	0.3159	0.3223	0.4771	0.4305
SITUATION 16	0.7936	0.6603	0.4838	0.3114	0.3413	0.6618	0.4622
SITUATION 17		0.7601	0.3679	0.1838*	0.2915	0.7666	0.4614
SITUATION 18			0.3172	0.2050*	0.2605	0.7343	0.3719
SITUATION 19				0.4826	0.4006	0.3160	0.3420
SITUATION 20					0.1310+	0.2797	0.2779
SITUATION 21						0.3567	0.1950*
SITUATION 22							0.4162

(N=200)
All intercorrelations $p<0.001$ except :-
* $p<0.01$, ** $p<0.05$, + not significant

TABLE 6.4 TABLE OF INTERCORRELATIONS OF REACTION SCORES(TWO TAILED SIGNIFICANCE)

	REACTION 2	REACTION 3	REACTION 4	REACTION 5	REACTION 6	REACTION 7	REACTION 8
REACTION 1	0.5239	0.3197	0.3965	0.6392	0.6403	0.6674	0.4811
REACTION 2		0.4183	0.5628	0.6315	0.5775	0.5838	0.6651
REACTION 3			0.6225	0.4043	0.3678	0.3875	0.3976
REACTION 4				0.6457	0.5482	0.6029	0.5437
REACTION 5					0.7926	0.8099	0.6865
REACTION 6						0.7856	0.6776
REACTION 7							0.7089

(N=200)

p<0.001 for all intercorrelations

This consistency suggested that S's as a group may react to situations in similar ways. Further confirmation of this was seen in the MANOVA where the percentage of variance of the reaction x subject interaction was only 7.48%.

Table 6.5 shows correlations between situations and the variables rank, experience, sickness, age and type A behaviour. The only two significant correlations between rank and situations were situation 3 and 4 both of which were negatively correlated and significant at the $p<.05$ level. Both these situations dealt with contact with senior officers and it showed that as the rank difference between individuals decreased S's felt less anxious when dealing with situations involving contact with those officers. In other words, they were more used to dealing directly with officers of a higher rank and therefore felt more comfortable and competent about it. With experience and situations the correlations showed negative values for all situations except 'having to perform repetitive drills' which was significant at the $p<.05$ and 'being unsure of how a piece of equipment works' although this did not reach significance. Taking the negative values under experience, situations 7,9,11 and 13 were significant at $p<.05$ and situations 10 and 12 were significant at the $p<.01$ and $<.001$ levels respectively. All these negative values seemed to indicate that experience reduced the levels of anxiety felt by S's

TABLE 6.5 TABLE OF CORRELATIONS BETWEEN SITUATIONS AND THE VARIABLES:-RANK,AGE, EXPERIENCE,SICKNESS & TYPE A BEHAVIOUR

	RANK	EXPERIENCE	SICKNESS	AGE	TYPE A BEHAVIOUR
SITUATION 1	-0.1253	-0.1372	-0.0636	-0.1075	0.0126
SITUATION 2	-0.1013	-0.0696	0.0370	-0.0363	-0.1243
SITUATION 3	-0.1927 +	-0.0960	-0.0377	-0.0160	-0.2531 +
SITUATION 4	-0.1978 +	-0.1148	-0.0648	-0.0810	-0.2087 +
SITUATION 5	0.0245	-0.1593	-0.1712	-0.2798 *	0.0631
SITUATION 6	-0.0863	-0.1330	0.0679	-0.1695	-0.2194 +
SITUATION 7	-0.1059	-0.2002 +	-0.0121	-0.2374	-0.3252 **
SITUATION 8	-0.1230	-0.1557	0.0289	-0.1741	-0.2840 *
SITUATION 9	-0.0919	-0.1711 +	-0.0145	-0.1397	-0.2823 *
SITUATION 10	-0.1340	-0.2624 *	0.0082	-0.1896	-0.2443 +
SITUATION 11	-0.1023	-0.1915	0.0239	-0.2860 *	-0.1975
SITUATION 12	-0.0812	-0.2947 **	-0.0715	-0.3142 *	-0.2260 +
SITUATION 13	-0.0298	-0.2085	-0.0010	-0.1778	-0.2344
SITUATION 14	0.0133	-0.1565	-0.2062	-0.1798	0.0722
SITUATION 15	0.0761	-0.0349	-0.1088	-0.0588	-0.0665
SITUATION 16	0.0932	-0.1078	-0.0569	-0.0963	-0.0259
SITUATION 17	0.0440	-0.0051	-0.0583	0.0612	0.0193
SITUATION 18	0.0103	-0.0682	-0.1224	-0.0035	-0.0661
SITUATION 19	0.0311	0.1990 +	-0.1439	0.0132	0.1306
SITUATION 20	-0.0697	-0.1490	0.0271	-0.1184	-0.2138 +
SITUATION 21	0.1149	-0.0057	-0.1501	-0.1319	0.0189
SITUATION 22	0.0262	-0.0682	-0.1314	0.0366	-0.1264
SITUATION 23	0.0069	0.1976 +	0.0754	0.1964	-0.1724
N=	142.0000	142.0000	58.0000	88.0000	94.0000

All correlations two tailed significance
*p<0.01,**p<0.001
+p<0.05

especially when attending emergency calls and these correlations tended to support hypothesis 5. There were no significant correlations between sickness and situations and a similar pattern of correlations to that of experience emerged for situation and age. This, it was assumed, was a natural progression as age must be positively linked to experience.

Type A behaviour correlated negatively with situations 3, 4, 6, 10, 12, 20 at $p<.05$, situations 8 and 9 at the $p<.01$ level and situation 7 reached significance at $p<.001$. As is confirmed by the factor analysis below, these groups of situations provide the most anxiety provoking moments for S's and yet there was a negative correlation which seemed counter-intuitive. Type A behaviour is a personality characteristic which was proposed by Rosenman, Friedman, Straus, Jenkins, Zyzanski & Wurm (1970) who depicted the Type A person as hard driving, persistent, involved almost totally in work, having an enhanced sense of time urgency and being involved in leadership and achievement. The Type A person is prone to coronary heart disease whilst the Type B personality characteristics are the opposite of Type A. Caplan & Jones (1975) believed that Type A people should be most strongly strained by job stress because they are more involved in their work and are persistent. McMichael (1978) proposed that Type A people are more likely to perceive and exaggerate potentially stressful conditions

and therefore experience more stress at work and yet Keenan & McBain (1979) found no correlation at all between Type A behaviour and role overload (experienced by individuals as stress).

Dembroski & MacDougall (1978) have given an alternative view that Type A behaviour causes self imposed pressure and increased work loads which increases stress by reducing the opportunity for social support from fellow workers. Hurrell (1977) and Davdison (1979) found that in their studies of American and Australian Police few had been willing to seek social support from colleagues. This runs counter to the effect of 'jigsawing' and social support seeking of firefighters as a working group. There was no correlation at all between the 'jigsawing' situations 17, 18 and 22 and Type A behaviour. The Type A correlations tended not to support hypothesis 6.

Table 6.6 shows the table of correlations between the strength of reactions and the variables rank, experience, sickness, age and Type A behaviour. There was no significant correlations for rank, sickness, or type A behaviour although it was interesting to note that all the values for the correlations between type A behaviour and reactions were negative.

Experience showed significant negative correlations for reactions 1 and 7 at $p<.01$, 2 at $p<.05$ and 5 and 6 at $p<.001$. Age showed a similar pattern with reactions 1, 5, 6, and 7 significant at $p<.05$ level, again supporting

TABLE 6.6 TABLE OF CORRELATIONS BETWEEN REACTIONS AND THE VARIABLES:- RANK, EXPERIENCE,SICKNESS & TYPE A BEHAVIOUR

	RANK	EXPERIENCE	SICKNESS	AGE	TYPE A BEHAVIOUR
REACTION 1	0.0032	-0.2443 *	-0.1871	-0.2239	-0.1990
REACTION 2	-0.0506	-0.1685 +	-0.1820	-0.1565	-0.1565
REACTION 3	-0.0784	-0.1449	0.1058	0.0325	-0.0784
REACTION 4	-0.0436	0.0205	-0.0017	0.0459	-0.0523
REACTION 5	-0.0950	-0.3037 **	-0.0669	-0.2134	-0.1782
REACTION 6	-0.0855	-0.2788 **	-0.0331	-0.2305	-0.1851
REACTION 7	-0.0693	-0.2130 *	-0.0739	-0.2275	-0.1471
REACTION 8	-0.0672	-0.0354	-0.0478	-0.1719	-0.1492
N=	142.0000	142.0000	58.0000	88.0000	94.0000

All correlations two tailed significance
*p<0.01,**p<0.001
+p<0.05

hypothesis 5. Both age and experience are positively related, i.e. the older you are the more emergency calls and other situations you have encountered. Table 6.7 shows this to be the case beyond $p<.001$

Table 6.7 shows the intercorrelations between age, rank, service (experience), sickness, and Type A behaviour. Hypothesis 7 predicted that Type A behaviour, which is personality specific and therefore presumed to be relatively stable throughout a persons life, would correlate significantly with age, experience and rank. The results of the correlation between age and experience with Type A behaviour were not significant and these results supported hypothesis 7.

Sickness did not correlate with age, service or Type A behaviour which was surprising and part of hypothesis 8 was rejected. Where it was thought that rank would correlate positively with sickness due to the prediction that there was more of a tendency for officers to be Type A, the results showed exactly the opposite, with a negative correlation of $p<.05$ between the two. This could maybe be due to the conscientiousness and commitment that officers seem to display.

There was a significant positive correlation between Type A behaviour and rank and this was at the $p<.05$ level. Possession of an officer rank of whatever level means a commitment to leadership, discipline, authority, etc., and these can be aligned as typical behavioural aspects of a

TABLE 6.7 CORRELATION MATRIX FOR THE VARIABLES AGE,RANK,SICKNESS AND TYPE A BEHAVIOUR (TWO TAILED SIGNIFICANCE)

	RANK	SERVICE	SICKNESS	TYPE A BEHAVIOUR
AGE	0.2093 +	0.8351 **	(0.0301)	(0.0244)
RANK		0.3120 **	(0.2672) +	0.2047 +
SERVICE			(0.0874)	(0.0176)
SICKNESS				(0.0210)

+p<0.05, **p<0.0001

Type A person. It is therefore likely that officers are more likely to be Type A confirming that part of hypothesis 8.

As discussed above, Table 6.5 shows that for some situations, officers experience and perceive them the same as firefighters but there are also some situations which show a negative trend although only two reached significance in this negative direction. This trend tended to support hypothesis 9, i.e. that there would be a difference in the way that officers perceived some situations in comparison to firefighters. The boundary spanning role of officers and their difference of perception of situations is clearly shown by the results of situations 3 and 4 which have been discussed above.

This result is similar to those of Scott (1988) who researched firefighters heart rates using electro-cardiogram measurements through his developed methodology for the study of a ventricular cardiac strain score (VCSS). Scott found that rider officers (Station Officer rank in particular) appeared to be under most stress and he concluded that this was due possibly to the combined effects of physical activity and operational responsibility.

6.8.2 Comparison of Groups at different Levels of Experience

Tables 6.8 and 6.9 show the results of the one way analysis of variance with variables, situations, reactions

TABLE 6.8 ONE WAY ANALYSIS OF VARIANCE TABLE-SITUATIONS BY EXPERIENCED GROUPS WITH SCHEFFE MULTIPLE RANGE TEST(p<0.05)

	GROUP MEANS					BETWEEN GROUPS(F PROB.)	SCHEFFE TEST GROUPS SIG. DIFFERENT(p<0.05)
	1	2	3	4	5		
SITUATION 1	1.08	1.17	1.88	1.14	2.09	0.0001	2&3
SITUATION 2	2.00	1.31	2.37	1.38	2.58	0.0001	2&1,2&3,2&5
SITUATION 3	2.46	2.19	2.21	2.73	2.03	0.1188	NS
SITUATION 4	2.10	2.14	1.70	2.00	2.56	0.0013	NS
SITUATION 5	2.36	2.46	2.04	2.35	2.45	0.5446	NS
SITUATION 6	1.92	1.47	2.18	1.00	2.42	0.0712	NS
SITUATION 7	1.56	1.00	3.66	1.77	2.25	0.0001	3&1,3&2
SITUATION 8	1.43	1.00	1.68	1.77	2.64	0.0369	NS
SITUATION 9	1.34	1.41	2.36	1.87	1.75	0.0001	1&3,1&5,2&3,2&5
SITUATION 10	2.52	1.00	1.29	1.75	2.05	0.0001	1&3,1&2,1&4
SITUATION 11	3.03	1.96	1.05	1.98	2.54	0.0001	1&2,1&3,1&4,1&5
SITUATION 12	1.88	1.74	2.15	2.18	2.41	0.0324	NS
SITUATION 13	1.00	1.43	2.00	1.00	2.43	0.0001	2&3,2&5,1&3
SITUATION 14	2.10	2.07	2.13	2.46	2.10	0.6851	NS
SITUATION 15	3.78	1.70	1.48	1.50	2.13	0.0001	1&2,1&3,1&4
SITUATION 16	4.90	1.07	1.06	1.22	2.34	0.0001	1&2,1&3,1&4,1&5
SITUATION 17	1.47	1.52	1.50	1.06	2.04	0.0001	5&2,5&3,5&4
SITUATION 18	2.80	1.38	1.34	1.18	2.21	0.0001	1&2,1&3,1&4
SITUATION 19	1.34	2.03	1.72	2.06	2.42	0.0001	1&2,1&3,1&4,1&5,3&4
SITUATION 20	1.06	2.17	2.00	2.67	2.52	0.1721	NS
SITUATION 21	2.44	2.20	1.82	1.93	2.50	0.0012	1&3
SITUATION 22	2.45	2.03	1.38	1.29	2.80	0.0001	4&1,4&5,3&1,3&2,2&5
SITUATION 23	1.94	2.10	2.22	2.06	-0.17	0.0314	NS

group 1=up to 5 years service,group 2=5-10 years
group 3=10-15 years,group 4=15-20 years
group 5=over 20 years service. (N=134)

TABLE 6.9 ONE WAY ANALYSIS OF VARIANCE TABLE REACTIONS BY EXPERIENCED GROUPS WITH SCHEFFE MULTIPLE RANGE TEST(p<0.05)

	GROUP MEANS					BETWEEN GROUPS(F PROB.	SCHEFFE TEST GROUPS
	1	2	3	4	5		SIG. DIFFERENT(p<0.05)
REACTION 1	2.34	2.29	1.83	2.23	2.09	0.0001	3&1,3&2
REACTION 2	2.08	1.56	1.85	1.59	2.38	0.0001	2&1,2&5
REACTION 3	2.35	1.98	1.77	2.17	2.52	0.0001	3&1,3&5
REACTION 4	2.40	1.75	1.90	1.83	2.70	0.0001	2&1,2&5,3&1,3&5
REACTION 5	1.87	1.67	1.96	1.85	2.24	0.0982	ns
REACTION 6	2.01	1.68	2.22	1.61	2.73	0.0001	5&4,2&3,2&5
REACTION 7	1.95	1.75	2.06	1.89	2.48	0.0136	2&5
REACTION 8	1.99	1.46	1.79	1.61	2.25	0.0005	2&1,2&5

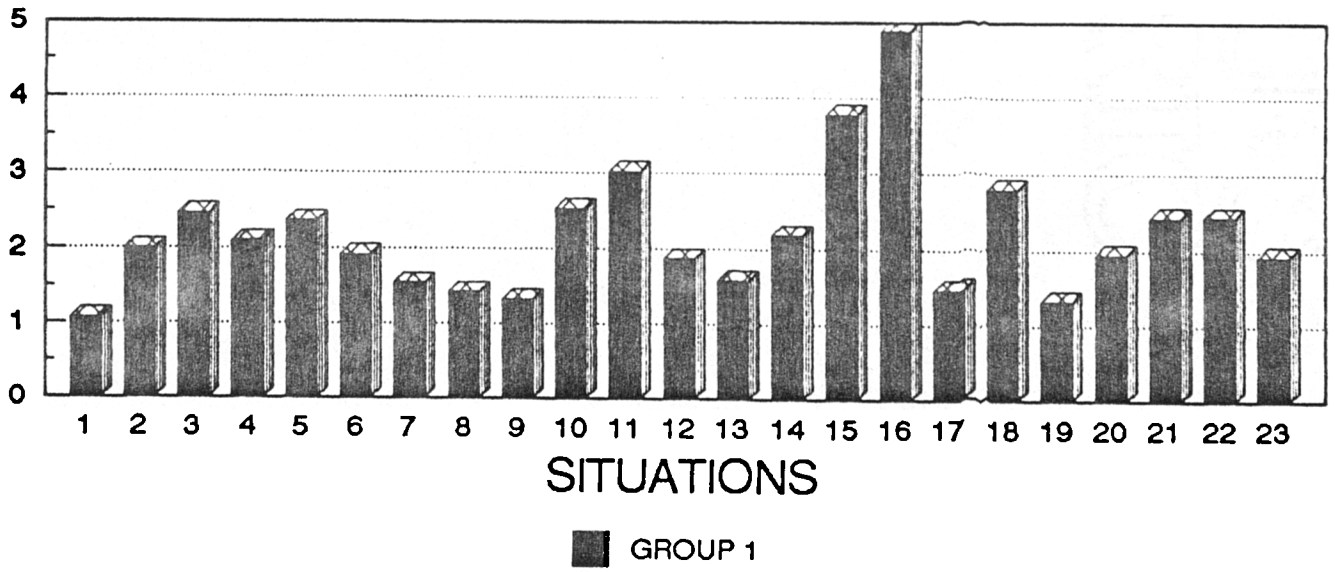
group 1=up to 5 years service,group 2=5-10 years
group 3=10-15 years,group 4=15-20 years
group 5=over 20 years service. (N=134)

and experience groups. Figures 6.3A,B,C,D,& E and 6.4 show the means for each group. This analysis attempted to tackle hypothesis 5. There were sufficient significant results in the main analyses to carry out an a posteriori test. Scheffe's test was used and the results are shown in the final columns of tables 6.8 and 6.9.

Although there were many single differences between groups in table 6.8 which were significant, the largest differences occured between group 1 and all others in situations 11, 16 and 19. Situation 11 and 16 showed a gradual reduction in anxiety felt by S's the greater their length of service probably due to experiencing real situations. Situation 19 showed an increase in anxiety with experience probably due to fear of failure in front of peers which becomes more prevalant the more years of experience that are gained. It could also be attributed to the sureness and competency felt by the less experienced group (group 1) due to the confidence built up within them during their intensive training over the first four years of service.

The same trend, i.e. decreasing anxiety with experience can be discerned between group 1 and various others in situations 10, 15, 18. More interesting is the column of group means which shows that group 5, the most experienced group, showed consistently higher strength of reaction scores for nearly all situations. This is naturally reflected in table 6.9 where group 5 again had

FIGURE 6.3A EXPERIENCED GROUP 1 MEAN SCORES FROM ONE WAY ANALYSIS OF VARIANCE FOR SITUATIONS

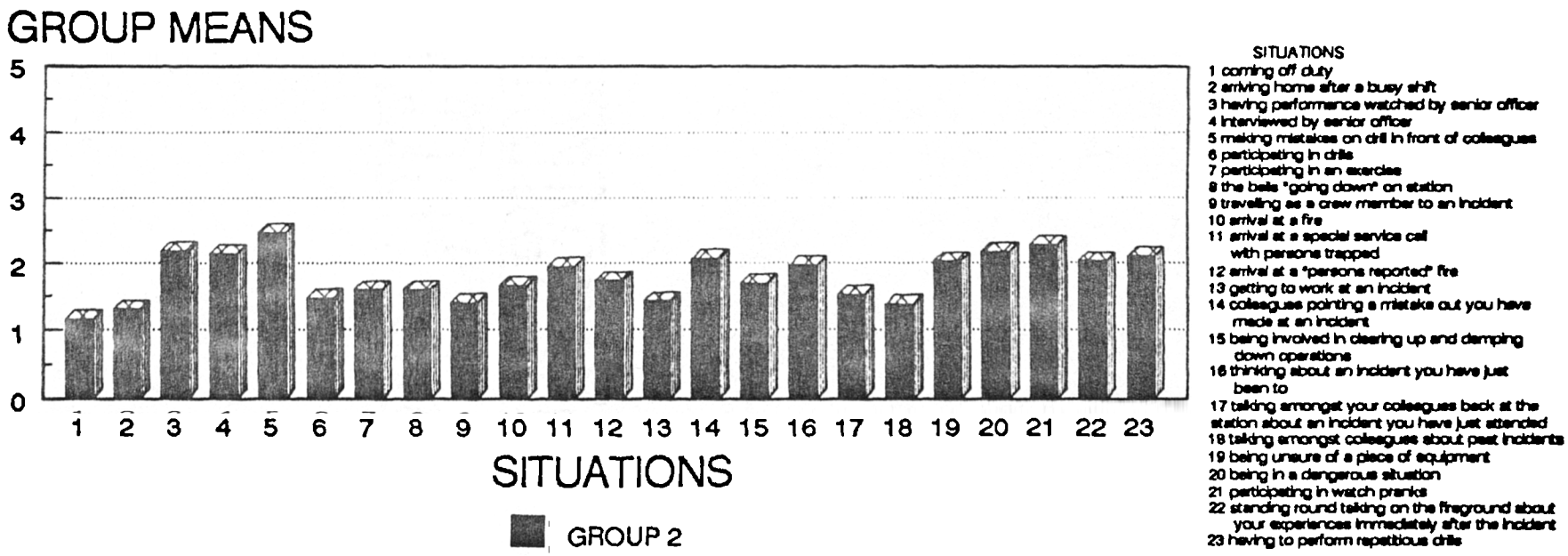


(N=143). group 1=up to 5 years service, group 2=5-10 years, group 3=10-15 years, group 4=15-20 years, group 5=over 20 years

SITUATIONS

1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
5 making mistakes on drill in front of colleagues
6 participating in drills
7 participating in an exercise
8 the bells "going down" on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at a special service call with persons trapped
12 arrival at a "persons reported" fire
13 getting to work at an incident
14 colleagues pointing a mistake out you have made at an incident
15 being involved in clearing up and damping down operations
16 thinking about an incident you have just been to
17 talking amongst your colleagues back at the station about an incident you have just attended
18 talking amongst colleagues about past incidents
19 being unsure of a piece of equipment
20 being in a dangerous situation
21 participating in watch pranks
22 standing round talking on the fireground about your experiences immediately after the incident
23 having to perform repetitious drills

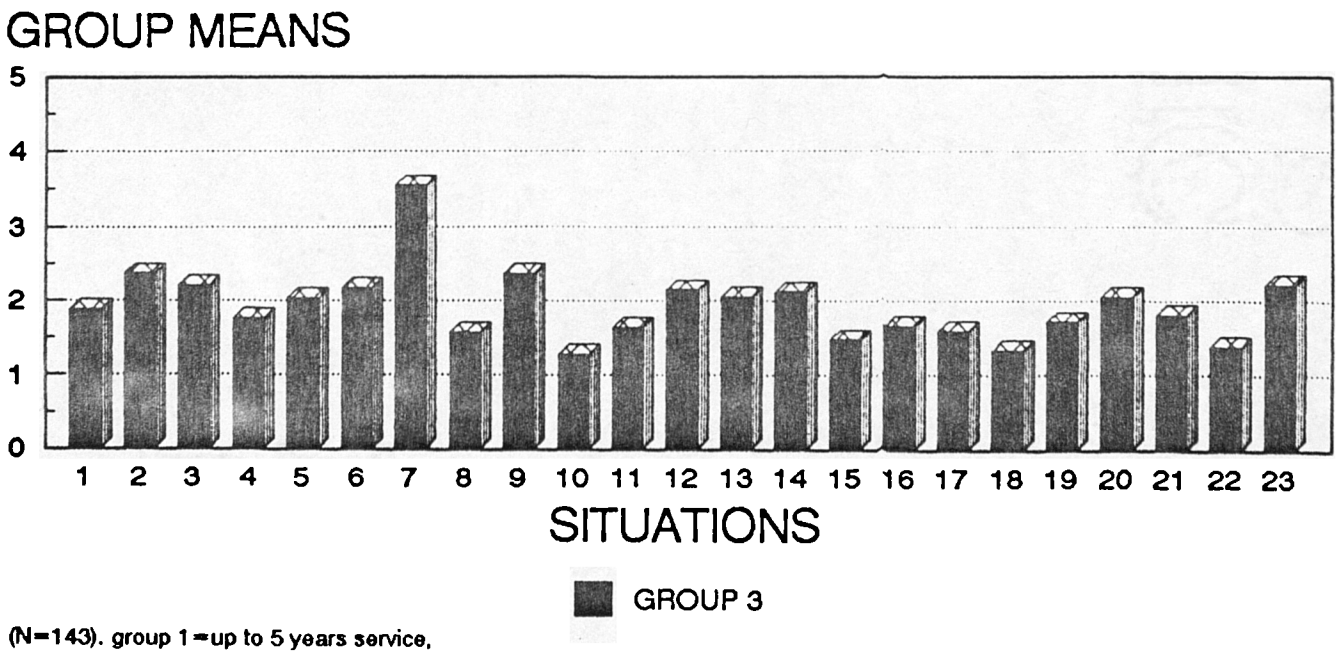
FIGURE 6.3B EXPERIENCED GROUP 2 MEAN SCORES FROM ONE WAY ANALYSIS OF VARIANCE FOR SITUATIONS



SITUATIONS
1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
5 making mistakes on drill in front of colleagues
6 participating in drills
7 participating in an exercise
8 the bells "going down" on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at a special service call with persons trapped
12 arrival at a "persons reported" fire
13 getting to work at an incident
14 colleagues pointing a mistake out you have made at an incident
15 being involved in clearing up and damping down operations
16 thinking about an incident you have just been to
17 talking amongst your colleagues back at the station about an incident you have just attended
18 talking amongst colleagues about past incidents
19 being unsure of a piece of equipment
20 being in a dangerous situation
21 participating in watch pranks
22 standing round talking on the fireground about your experiences immediately after the incident
23 having to perform repetitious drills

(N=143). group 1=up to 5 years service, group 2=5-10 years, group 3=10-15 years, group 4=15-20 years,group 5=over 20 years

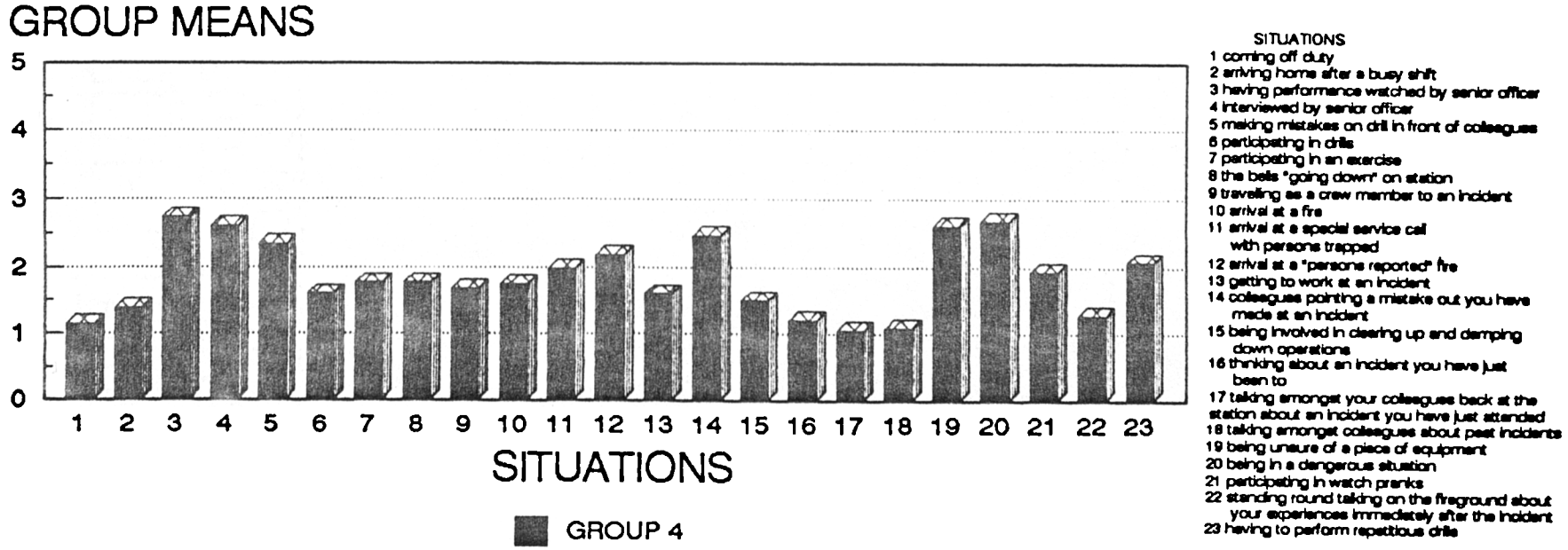
FIGURE 6.3C EXPERIENCED GROUP 3 MEAN SCORES FROM ONE WAY ANALYSIS OF VARIANCE FOR SITUATIONS



SITUATIONS
1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
5 making mistakes on drill in front of colleagues
6 participating in drills
7 participating in an exercise
8 the bells "going down" on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at a special service call with persons trapped
12 arrival at a "persons reported" fire
13 getting to work at an incident
14 colleagues pointing a mistake out you have made at an incident
15 being involved in clearing up and damping down operations
16 thinking about an incident you have just been to
17 talking amongst your colleagues back at the station about an incident you have just attended
18 talking amongst colleagues about past incidents
19 being unsure of a piece of equipment
20 being in a dangerous situation
21 participating in watch pranks
22 standing round talking on the fireground about your experiences immediately after the incident
23 having to perform repetitious drills

(N=143). group 1=up to 5 years service, group 2=5-10 years, group 3=10-15 years, group 4=15-20 years, group 5=over 20 years

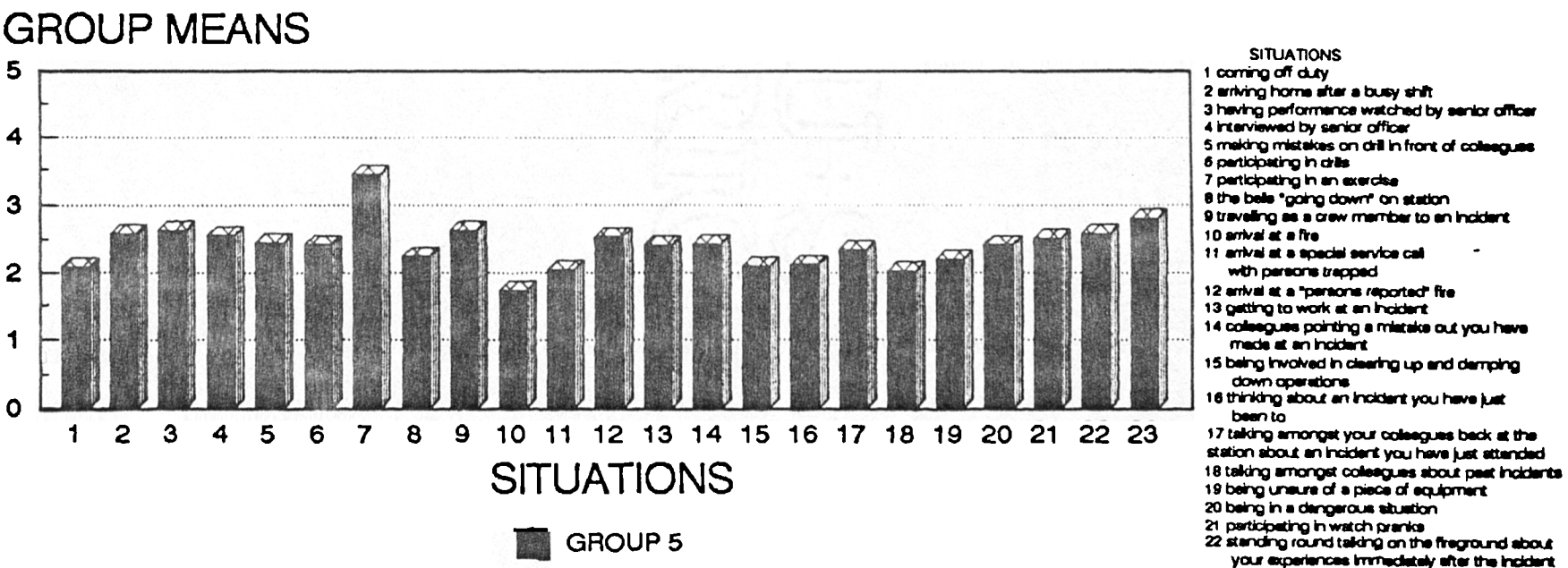
FIGURE 6.3D EXPERIENCED GROUP 4 MEAN SCORES FROM ONE WAY ANALYSIS OF VARIANCE FOR SITUATIONS



SITUATIONS
1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
5 making mistakes on drill in front of colleagues
6 participating in drills
7 participating in an exercise
8 the bells "going down" on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at a special service call with persons trapped
12 arrival at a "persons reported" fire
13 getting to work at an incident
14 colleagues pointing a mistake out you have made at an incident
15 being involved in clearing up and damping down operations
16 thinking about an incident you have just been to
17 talking amongst your colleagues back at the station about an incident you have just attended
18 talking amongst colleagues about past incidents
19 being unsure of a piece of equipment
20 being in a dangerous situation
21 participating in watch pranks
22 standing round talking on the fireground about your experiences immediately after the incident
23 having to perform repetitious drills

(N=143). group 1=up to 5 years service, group 2=5-10 years, group 3=10-15 years, group 4=15-20 years, group 5=over 20 years

FIGURE 6.3E EXPERIENCED GROUP 5 MEAN SCORES FROM ONE WAY ANALYSIS OF VARIANCE FOR SITUATIONS

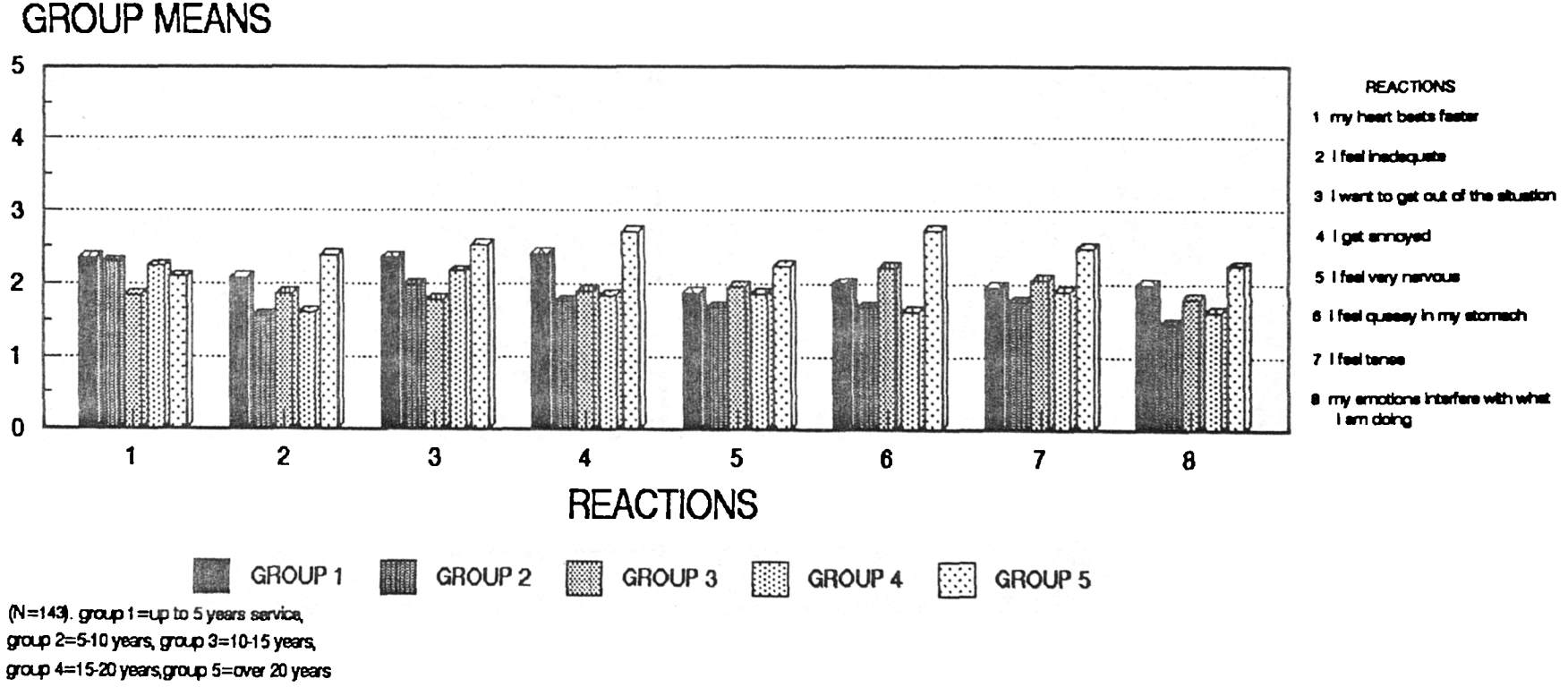


(N=143). group 1=up to 5 years service, group 2=5-10 years, group 3=10-15 years, group 4=15-20 years, group 5=over 20 years

SITUATIONS

1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
5 making mistakes on drill in front of colleagues
6 participating in drills
7 participating in an exercise
8 the bells "going down" on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at a special service call with persons trapped
12 arrival at a "persons reported" fire
13 getting to work at an incident
14 colleagues pointing a mistake out you have made at an incident
15 being involved in clearing up and damping down operations
16 thinking about an incident you have just been to
17 talking amongst your colleagues back at the station about an incident you have just attended
18 talking amongst colleagues about past incidents
19 being unsure of a piece of equipment
20 being in a dangerous situation
21 participating in watch pranks
22 standing round talking on the fireground about your experiences immediately after the incident
23 having to perform repetitious drills

FIGURE 6.4 CHART OF EXPERIENCED GROUPS MEAN SCORES FROM ONE WAY ANALYSIS OF VARIANCE FOR REACTIONS



(N=143). group 1=up to 5 years service, group 2=5-10 years, group 3=10-15 years, group 4=15-20 years,group 5=over 20 years

the highest means for all reactions except reaction 1.

From an overall viewpoint of the results of the post hoc comparisons, it appeared that there was a development of professional competency which reached a high point between 5 and 20 years service. Before and after these time points there was an overall increase in anxiety to certain situations which may lead to the speculation of lack of competency in one direction and over competency in the other or maybe an overall gradual dysfunction. It is also interesting to note that there were some situations where their perception did not change over time with experience and all of these (situations 3, 4, 5, 6, 8, 12, 12, 14, 20, and 23) are situations which show high strength of reaction means and are therefore presumed to be the most anxiety provoking.

6.8.3 Factor Analysis of Situations and Reactions

Both situations and reactions were factor analysed. Only one factor was extracted from the analysis of reactions and the solution could not therefore be rotated. The varimax rotated factor matrix for situations is shown in Table 6.10.

Four factors emerged from the analysis. The first was concerned with situations that were directly connected to emergency actions at incidents and was labelled 'At the Incident'. Factor 1 accounted for the largest part of the variance which was 45.4%. Factor 2 labelled 'Post Incident' contained situations which S's used for

TABLE 6.10 FACTOR ANALYSIS OF SITUATIONS VARIMAX ROTATED FACTOR MATRIX

	FACTOR 1 AT AN INCIDENT	FACTOR 2 POST INCIDENT	FACTOR 3 ROUTINE	FACTOR 4 COMPETENCY
SITUATION 8	0.66335	0.37648	0.28770	0.05864
SITUATION 9	0.68367	0.42158	0.36228	0.02526
SITUATION 10	0.76083	0.29453	0.31596	0.12368
SITUATION 11	0.80086	0.14060	0.04142	0.18247
SITUATION 12	0.83155	0.16108	0.13167	0.12631
SITUATION 13	0.67323	0.44171	0.25291	0.20969
SITUATION 20	0.64060	0.01202	0.08366	0.36052
SITUATION 15	0.21241	0.52050	0.26903	0.29907
SITUATION 16	0.29177	0.79313	0.09793	0.26985
SITUATION 17	0.15397	0.87249	0.17727	0.14291
SITUATION 18	0.17709	0.82000	0.17859	0.08160
SITUATION 22	0.21717	0.79511	0.20698	0.15080
SITUATION 1	-0.00035	0.22570	0.76640	0.13939
SITUATION 2	0.03719	0.33927	0.57603	0.06822
SITUATION 3	0.37834	0.02261	0.69801	0.27201
SITUATION 4	0.37903	0.06469	0.64104	0.18279
SITUATION 6	0.33514	0.33001	0.63823	0.22131
SITUATION 7	0.47636	0.24707	0.59755	0.22314
SITUATION 23	0.28617	0.39699	0.27061	0.24382
SITUATION 5	0.20645	0.09937	0.34669	0.73408
SITUATION 14	0.33693	0.20403	0.11950	0.79925
SITUATION 19	0.26905	0.20802	0.07149	0.77523
SITUATION 21	-0.08964	0.26670	0.28534	0.58167
% of variance	45.40000	8.40000	7.30000	6.10000

KEY TO SITUATIONS WITHIN EACH FACTOR

FACTOR 1

8 the bells going down on station
9 travelling as a crew member to an incident
10 arrival at a fire
11 arrival at special service call persons trapped
12 arrival at persons reported fire
13 getting to work at an incident
20 being in a dangerous situation

FACTOR 2

15 involved in clearing up and damping down
16 thinking about an incident you have just been to
17 talking amongst colleagues back at station about an incident you just have attended
18 talking amongst colleagues about past incidents
22 standing round talking on the fireground about your experiences immediately after the incident

FACTOR 3

1 coming off duty
2 arriving home after a busy shift
3 having performance watched by senior officer
4 interviewed by senior officer
6 participating in drills
7 participating in an exercise
23 performing repetitious drills

FACTOR 4

5 making mistakes on drill in front of colleagues
14 colleagues point out mistake you made at incident
19 being unsure of a piece of equipment
21 participating in watch pranks

reflection on incidents past and present, a behaviour which has been termed in the study 'Jigsawing'. The third factor reflected those situations which could be categorised as 'normal routine' including taking part in exercises and appraisal. Situation 23 'having to perform repetitive drills' did not load on any one factor and it was therefore placed with factor 3 as the 'nearest fit' both in prose description and numerically. Factor 4 emerged from errors and misdemeanours and was labelled 'Inadequacy'. The results of the factor analysis showed clear groupings of situations and four well delineated factors were established.

The factor analysis supported hypothesis 1 by showing that there was a taxonomy of occupational situations which, with each factorial classification, elicited similar strength of reactions regardless of age, experience, Brigade, Type A behaviour or rank. Hypothesis 4 was also given support by this analysis in that S's as an occupational group showed situational specificity.

6.8.4 Main and Interaction Effects of Situations and Reactions

Table 6.11 shows the results of the MANOVA with situations, reactions and the interaction effects all being statistically significant beyond the $p<.001$ level. More interestingly, Table 6.12 compares the range and median percentages of variance of a summary of 22 studies collated by Endler & Hunt (1969) with the percentage of

TABLE 6.11 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF SITUATIONS AND REACTIONS

SOURCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	5248.92		198				
WITHIN Ss TOTAL	36772.60		36417				
SITUATIONS		7843.85		22	356.54	212.18	<0.000
SITUATIONS ERROR		7319.72		4356	1.68		
REACTIONS		2331.76		7	333.11	146.82	<0.000
REACTIONS ERROR		3144.51		1386	2.27		
SITUATION X REACTION		4269.88		154	27.73	71.27	<0.000
SITS X REACTS ERROR		11862.88		30492	0.39		
TOTALS		42021.52		36615			

(N=200)

TABLE 6.12 SUMMARY OF THE PERCENTAGE OF VARIANCE FROM 22 STUDIES REPORTED BY ENDLER & HUNT, PAYNE et al & PRESENT STUDY

	ENDLER & HUNT		PAYNE et al	PRESENT STUDY
	median of var.(%)	range of variance(%)		
SITUATIONS	4	2-14	10	18.67
RESPONSES/REACTIONS	25 } 33	15-40	10 } 36	5.5 } 37
SUBJECTS	4	1-10	16	12.49
PERIODS				
SITNS X REACTS	8	4-13	10	10.16
SITNS X SUBJECTS	9 } 27	4-22	15 } 39	17.42 } 35
REACTS X SUBJECTS	10	5-16	14	7.48
RESIDUALS	37	22-50	25	28

Percentages are rounded to the nearest whole number

variance from Payne et al's (1982) finding and the present study's percentages of variance.

The totals of variance are distributed fairly evenly between the main effects, interactions and the residuals and all the interactions fall within the percentage range of variance quoted by Endler & Hunt (1969) (Table 6.12).

The percentage of variance accounted for by the subjects main effect in the present study accounted for 12.49% and less than Payne et al's (1982) study of 16%. This was probably due to the homogeneity of the sample S's in both Endler & Hunts survey of studies and also the present study. This result also confirmed directly part of hypothesis 2.

It can also be seen from Table 6.12 that the reaction percentage of variance in the present study was very much lower than both Endler & Hunt and Payne et al's reports. The present study's percentage of variance for reactions of 5.5% was similar to the average percentage of variance of 5.4% found for the variable 'anxiety' in a study by Moos (1969) who accounted for the low figure in the same manner as the present study and Payne et al's study. Payne et al and Moos accounted for their comparatively low percentage of variance on the reactions by the restricted range of reactions used in both their studies. The same argument could apply to the present study where the reactions were 'trimmed' and adapted further mainly due to the occupational nature of a firefighter's job and where

some reactions used by other studies would not have been practical or relevant to use, e.g. I do not perspire - I perspire freely.

The situations main effect in the present study accounted for substantially more variance than either of the other two main effects and was also substantially larger than those reported by the other two studies. This could be due in part to using a larger number of situations but bearing in mind that Payne et al used nearly as many situations i.e. 20 and the percentage of variances were 18.67% and 10% for the present and Payne et al's studies respectively, then it is more than likely that the difference is due to the extremes (variety) of the situations used in the present study in conjunction with their occupational specificity. Indeed, the ALSCAL results (below) give four clear clusters of situations whereas the INDSCAL (Carroll & Chang, 1970) clustering model used by Payne et al (1982) only produced 3 clusters.

The percentage of variance that the situation main effect produced did not therefore agree with the prediction made by hypothesis 2 although the difference has been partially explained by the variety and occupational specificity of the situations used.

The interaction effects across all of the studies in Table 6.12 are remarkably similar with the subject x situation interaction accounting for the greatest percentage of variance overall. However, the sum of the

variances for the interaction effects in the present study (35%) did not account for more of the variance than the main effects (37%) although the difference was small (2%). The interaction effects were still sizeable and similar to the other studies in Table 6.12 and need to be explained precisely. They could be due to the action and reaction of individual subjects to each situation using their own behavioural characteristics and if this was the case then no patterning would appear across subjects. However, if the variance due to the interaction of persons, situations and reactions was more important than the variance due to the persons, situations and reactions per se, then interpretable patterns within the interactions would emerge. The MANOVA confirmed hypothesis 2 and established that there were interaction effects acting on the data and the next analysis tested the structure of the data and the interactions by the multidimensional scaling technique ALSCAL.

6.8.5 Determination of the Underlying Structure of the Data

The factor analysis showed that there were groups of situations that differed from each other through measures of association. The multidimensional scaling technique ALSCAL was used to determine the underlying structure of the data producing a two-dimensional spatial configuration from a single proximities matrix. This matrix of data had two ways. INDSCAL could not be used because the data only

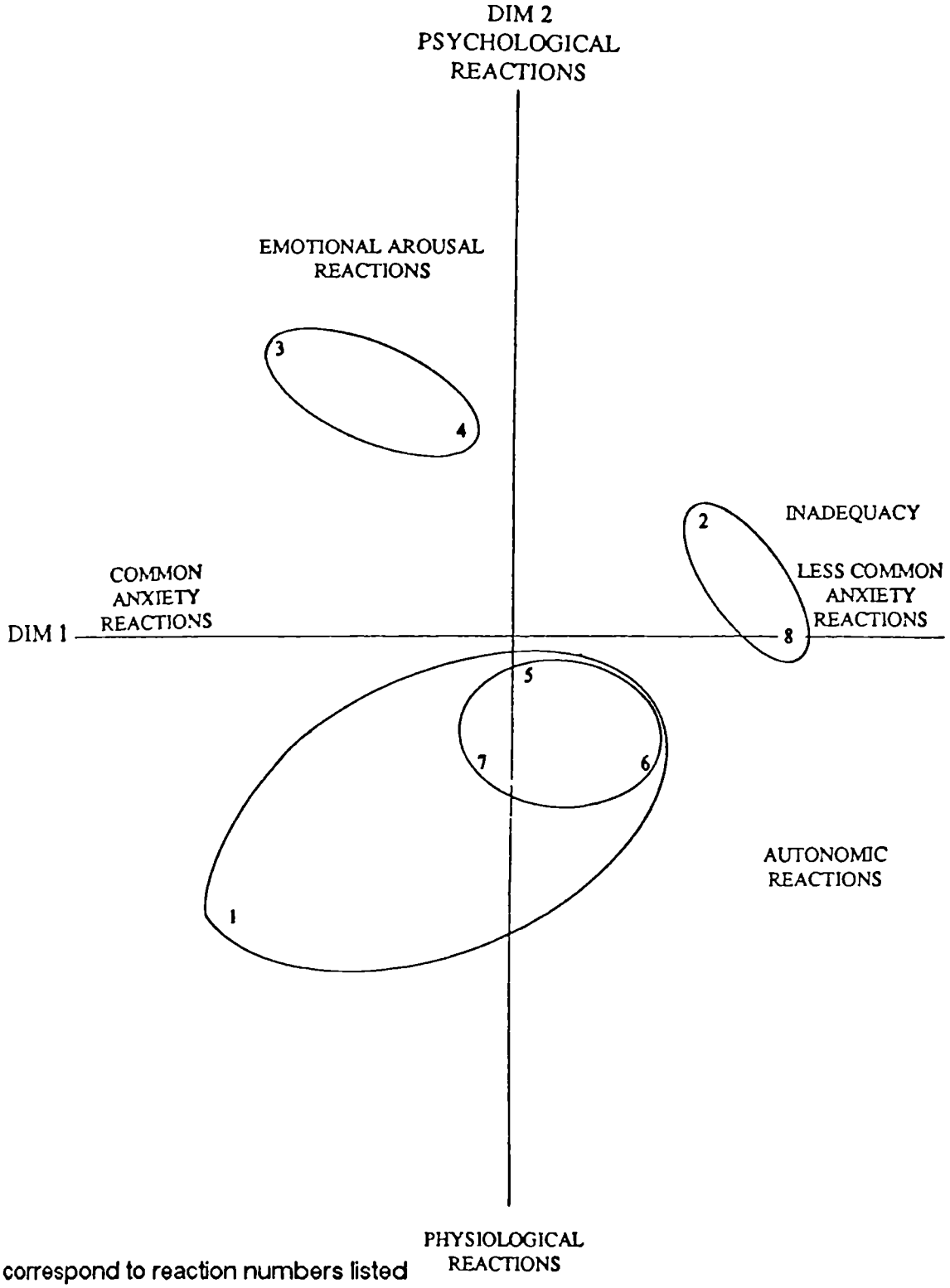
produced a single matrix. However there was already clear evidence in the data that individual characteristics were not having a sizeable effect and the characteristics were homogenous to the subject group. There was therefore no need to include a dimension (individuals) which was a parameter (in its true mathematical sense) in the present study.

Schiffman et al (1981) adds that since individuals are always associated with the first or second way of the data, they are always represented as points in a Euclidean space. Since analysis of these data always represents the individual as points, the analysis always implies that there are individual differences in perception and cognition. Added to this, when the conditionality is matrix conditional as in the present case, then the implication is that individuals do not vary in their style of response and this has been shown already in the results of some of the statistical analyses presented above.

Clearly then, the ALSCAL model on its own was sufficient to analyse the data and Figure 6.5 shows the ALSCAL analysis of reactions giving a two-dimensional spatial structure with clusters superimposed and outlined.

There were three distinct clusters. The first was labelled 'emotional arousal reactions' and contained reactions 3 and 4, 'I wish to get out of the situation' and 'I get annoyed' respectively. The second cluster contained reactions 1,5,6, and 7 which represented what

FIGURE 6.5 ALSCAL ANALYSIS OF REACTIONS IN TWO DIMENSIONS



Numbers correspond to reaction numbers listed in key overleaf

KEY TO CLUSTERS OF REACTIONS IN FIGURE 6.5

CLUSTER 1 EMOTIONAL AROUSAL

3 I want to get out of situation
4 I get annoyed

CLUSTER 2 INADEQUACY

2 I feel inadequate
8 my emotions interfere with what I am doing

CLUSTER 3 AUTONOMIC

1 my heart beats faster
5 I feel nervous
6 I feel queasy in my stomach
7 I feel tense

could be described as 'autonomic reactions'. The third cluster was labelled 'inadequacy' and contained reactions 2 and 8 which dealt with inadequacy and emotional interference.

The fit of the ALSCAL model of reactions was similar to the INDSCAL analysis of response modes by subject interaction produced by Payne et al (1982) and the first dimension matched the mean scores by reactions in Table 6.2. This dimension matched closely the mean scores for reactions reported in Table 6.2 and distinguished the reaction clusters between the more common 'emotional arousal' reactions and the less common 'inadequacy' reactions clusters. The 'autonomic' reactions straddled the division.

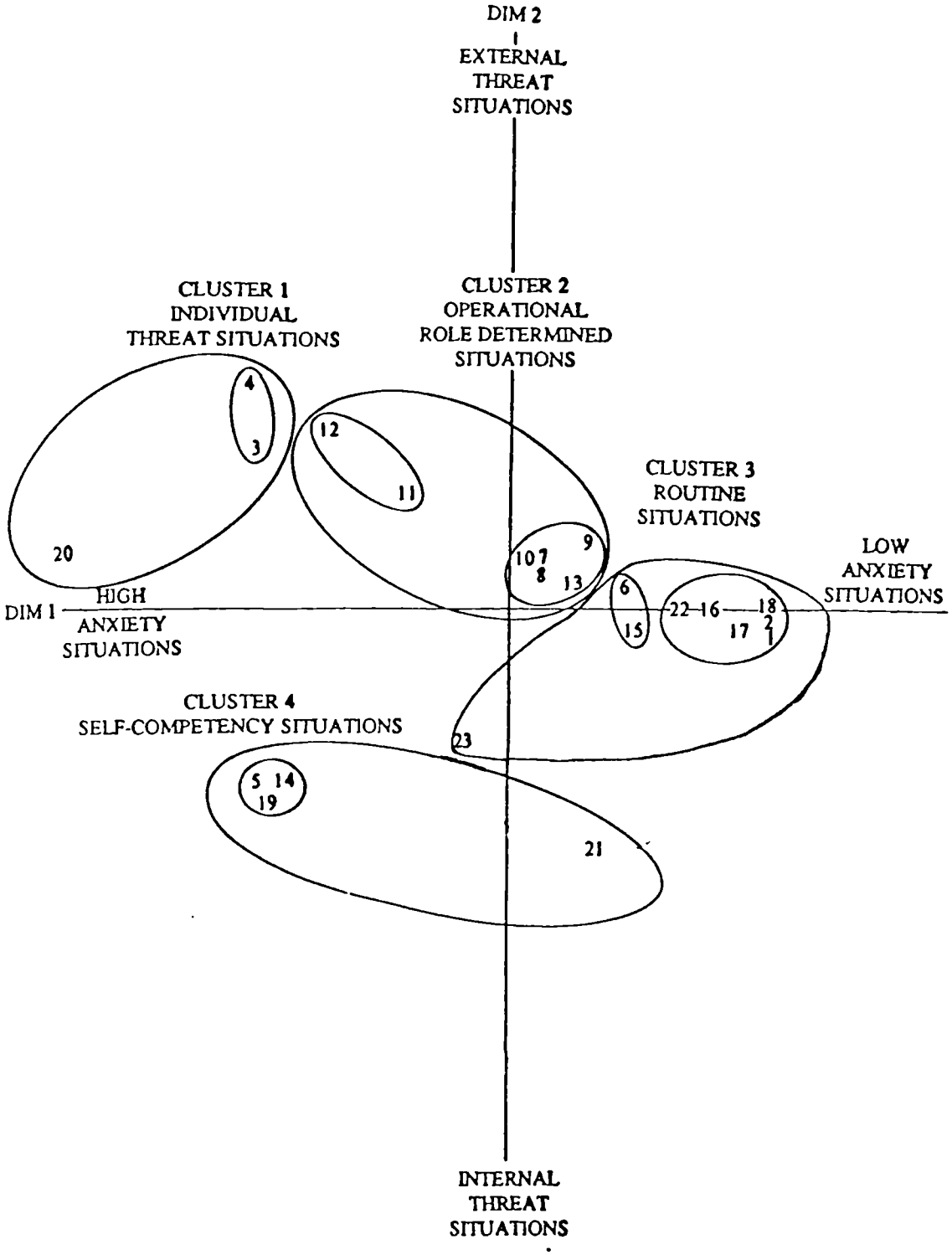
The second dimension seemed to distinguish between 'emotional arousal' and 'autonomic' reactions and the dimension was therefore labelled psychological/ physiological reactions. The 'inadequacy' reactions clustered around the centre of this dimension although there was a tendency towards the psychological reaction end of the dimension.

One characteristic of the ALSCAL result was that for the more common but less anxious reactions, it seemed that individuals adhered to their own inherent patterns of strength of reactions to anxiety provoking situations, whereas for the less common but more anxious reactions, which are characteristic of high levels of stress, there

seemed to be a reduction in the heterogeneity of strength of reaction patterns towards a more homogenous patterning. These findings were in accord with hypotheses 4 and 10. Hypothesis 10 was also confirmed by the ALSCAL analysis of situations.

Figure 6.6 indicates the ALSCAL analysis of situations within a two-dimensional spatial structure and the patterning of the clusters are outlined within the dimensions. The ALSCAL analysis produced an interpretable solution in this two-dimensional space. The first dimension (DIM 1) showed differences between high and low anxiety producing situations and the second dimension (DIM 2) distinguished between individual threat situations which were not of the S's own making, i.e. externally provoked, and threat situations where the threat was generated by the individual i.e. internally provoked. The ALSCAL analysis gave an order to all the situations which grouped into four clusters around the two dimensions. Cluster 1 contained those situations where the individual was in a threat situation and the threat was external to the individual (situation 20:- 'being in a dangerous situation; situation 4:- 'being interviewed by a senior officer; and situation 3:- 'having your performance watched by a senior officer'). Cluster 2 contained those situations that were operationally role determined i.e. fires and other incidents including situations 11 and 12, 'arrival at a special service call with persons trapped'

FIGURE 6.6 ALSCAL ANALYSIS OF SITUATIONS IN TWO DIMENSIONS



Numbers correspond to situation numbers listed in key overleaf

KEY TO CLUSTERS OF SITUATIONS IN FIGURE 6.6

CLUSTER 1 INDIVIDUAL THREAT SITUATIONS

4 interviewed by senior officer
3 having performance watched by senior officer
20 being in a dangerous position

CLUSTER 2 OPERATIONAL ROLE DETERMINED

7 participating in an exercise
8 the bells going down on station
9 travelling as a crew member to an incident
10 arrival at a fire
13 getting to work at an incident
11 arrival at a special service call, persons trapped
12 arrival at a persons reported fire

CLUSTER 3 ROUTINE

1 coming on duty
2 arriving home after a busy shift
16 thinking about an incident just attended
17 talking with colleagues back at station about an incident you have just attended
22 standing round talking on fireground about your experiences immediately after the incident
6 participating in drills
15 being involved in clearing up and damping down operations
23 having to perform repetitious drills

CLUSTER 4 SELF COMPETENCY SITUATIONS

5 making mistakes on drill in front of colleagues
14 colleagues pointing out mistakes you made at an incident
19 being unsure of a piece of equipment
21 participating in watch pranks

and 'arrival at a persons reported fire', which tended to cluster towards the high anxiety situations dimension. Cluster 3 covered routine situations and interestingly contained the 'jigsawing' situations closely grouped around the low anxiety end of the dimension in a 'no threat' configuration. Cluster 4 included those situations of threat to the individual brought about by lack of self competency (internally provoked).

It was clear from this ALSCAL analysis that high anxiety situations, especially those which deal with individual threat were more distinguishable from each other than the low anxiety situations of the self competency cluster 4. This meant that for high anxiety situations, the FSJRQ was sensitive enough to reveal clear groupings of reactions in its measure of anxiety whilst at the same time showing a homogeneity within the S's in their ordering of anxiety provoking situations. This result supports the notion within hypothesis 1 that a taxonomy of occupational situations which are more likely to cause anxiety than others can be discerned through the differing strengths of S's reactions to those situations. Hypothesis 3 was also supported in that there appeared to be a patterning of reactions evoked by the situations and this was revealed not in the concensus that S's found in ordering the situations but the differences that they perceived in the range between low and high anxiety situations according to their strength of reactions to

those situations.

6.9 Discussion

The preliminary statistical analyses on the data revealed that there were differences between firefighters when they were divided into experience groups according to their length of service (used in the study as a measure of experience). Although all the firefighters used in the study were experienced in terms of the fire service definition, the experienced groups patterning indicated that the group with under 5 years experience seemed competent theoretically yet they reported feeling more anxious than the other groups when attending emergencies. The middle years of the service groups i.e. 5 to 20 years, reported less anxiety about nearly all situations in comparison with the first and last groups which were those with under 5 years service and over 20 years service respectively. The latter group showed consistently high scores across all situations and this may probably be due to a change in emphasis on how they viewed and experienced their career as they neared the end of it. This type of behaviour is similar to that found in war pilots by Grinker & Spiegel (1945) where higher anxiety was experienced as the pilots neared the end of their tour of duty and therefore began to expect that they might survive it. However, although there were differences the results supported the notion that there was a concensus between S's about which situations were anxiety provoking and

which were not. Further analysis of the data revealed that the S's as an occupational group showed homogeneity in the way they perceived and reacted to work situations. Those situations which showed high anxiety mean scores were therefore intrinsically stressful for all S's.

Type A behaviour did not seem to be correlated to age or experience, therefore rooting it as a 'fixed' characteristic. The officer ranks in the study showed significant Type A behaviour characteristics which was predicted although they did not show any significant increase in the amount of sickness they had. This result may have to be treated with caution as the obligations of officers and therefore their commitment is generally far greater than for the firefighter ranks and they are more likely not to book sick for duty even though they are ill. This would of course need to be researched separately but it has implications for officers long term health problems which may be related to the anxiety they experience.

The counter-intuitive result which showed negative correlations between Type A behaviour and the most anxiety provoking situations may be explained if the fire service attracts Type A people who then train for the emergency incident or anxiety provoking situation which is what they need to 'thrive'. They therefore enjoy the achievement of successful performance within those situations. Anxiety may only occur then if their reactions are frustrated. Another explanation may be that job competency and

experience affect behaviour in subtle ways and there may be interactions at work which act over time or to each situation. It may also be the case that Type A people indulge in denial. However, although not tested directly, there could not be a positive assumption made from looking at the raw scores that all S's were Type A.

It was clear from the correlation analysis that there was consistency across groups and within situations. It appeared that this homogeneity of perception of the different situations reflected the homogeneity of the subjects as an occupational group and could be analysed further. The factor analysis confirmed hypothesis 4 and showed that a taxonomy of specific situations could be defined and that this taxonomy consisted of four factors which could be clearly labelled as 'at an incident', 'post incident', 'routines' and 'competency'. The results of the factor analysis were markedly clear cut with factor 1 encompassing all the situations which could be defined as incident-connected whilst factor 2 contained all those situations which firefighters have within the previous studies identified as being important to them in helping them to cope. This activity has been defined in this set of studies as 'jigsawing' and has clearly emerged as an important factor in the coping process. Although the factor analysis showed that the situations could form a taxonomy and that the occupational group of firefighter was showing great homogeneity it could not differentiate

how and in which way the factors did differ.

Part of the main aim of this study was the testing of the interactionist position that behaviour would be determined by the interaction between individual reactions and situations. The multivariate analysis of the data supported hypothesis 2 with regard to the interactionist position showing that all three two-factor interactions were sizeable and comparable to other studies (Endler & Hunt,1969; Payne et al, 1982). However, the total variance due to the interaction effect (35%) was slightly less than that of the main effects (37%). It appears that this closeness of the percentage of variance between the interaction effects and the main effects may be indicative of the occupational specificity of the situations, and the homogeneity of the subjects that act to equal out the normal differences. It may also have been due to the use of situations that were not anxiety provoking together with anxiety provoking situations. The main effects and interactions are therefore equally important in occupational specific settings.

Having established that interactions were present in the data then the true test of the interactionist position was the search for meaningful patterns and structure within the data. The ALSCAL analysis of the reactions produced a two dimensional solution which showed that the more common reactions gave a wider spread of patterning suggesting that individuals tended to use their own

inherent patterns of reacting until there was a high level of anxiety experienced when the less common reactions were adopted. These less common reactions reduced the heterogeneity of reaction patterns and brought the patterning closer together (Figure 6.5). Generally speaking, the closer the clustering, the less individual differences there are.

The findings are similar to those of Payne et al (1982) and show that firefighters react to high anxiety provoking situations by the use of the less common 'inadequacy' and 'autonomic' reactions, whilst the most common reactions were used to deal with the less anxiety provoking situations. At first glance this seems to run counter to the notion gained from the earlier results that firefighters could be classified as an homogenous group in the way that they perceive and react to situations. If this is the case, how could S's as individuals use their own inherent patterns of reactions and yet maintain group patterning of reactions to be classified overall as homogenous in their reactions? Part of the answer to this may be that even though there is homogeneity within the occupational group of S's certain situations which are less anxiety provoking than others and which elicit the more common reactions allow more flexibility in individual interpretation. In this case, the reactions may not therefore need to be as specific as the situation is not perceived as crucial.

Homogeneity of the group can therefore be likened to a continuum which at one end uses a less rigourous approach allowing individual differences to play their part, whilst at the other end there is a fairly 'tight' but standard approach. The 'looseness' of the group homogeneity along the continuum will depend upon a number of factors but it is presumed that firefighters will only grasp this concept of homogeneity and this suggested 'looseness of fit' model which incorporates room for individual differences once they become a part of the homogenous group through training, competency and experience.

Another explanation may be that the heterogeneity introduced by the sample subjects chosen, who came from different brigades, and had differences in age, length of service, experience, etc., may have led to individual differences being prominent in some situations. However, although these factors allowed for maximum discrimination between the subjects in order that individual differences, if they were important, could be highlighted, the results did not confirm that this was indeed the case.

Having established that there was some form of consensus in reactions to situations, the ALSCAL analysis of the situations themselves revealed four clusters that were discernible (Figure 6.6). The situations which clustered at the high anxiety point of the dimension contained all those which threatened the individual

directly (either internally of externally provoked). The other high anxiety situation cluster was the one containing the operationally role determined situations. The low anxiety cluster was labelled 'routine situations' which contained its own sub-cluster of situations all related to the 'jigsawing' process.

The analysis supported hypotheses 1 and 3 by providing a taxonomy of occupationally specific situations where there was a strong agreement amongst S's about which situations were highly anxiety provoking and those which were less. The situations also formed meaningful patterns in line with the prediction of hypothesis 3. The interesting point here was that although clusters were formed by the ordering of situations by consensus into the high and low anxiety dimension, there were marked differences in the range between high and low anxiety situations (the spatial fit of the clusters).

It is clear from the situation analysis that there are three distinct situational sources of anxiety in a firefighter's occupation:-

i) Anxiety from individual threat situations where the threat is not determined by the individual (externally provoked).

ii) Anxiety from self competency situations where the threat is self induced (internally provoked).

iii) Anxiety from operational role determined situations.

Equally important, especially as it confirms the findings of the previous studies and adds to the understanding of coping and the use of coping strategies, is the fourth cluster 'routine situations'. This cluster contains the sub-cluster of activities that have been identified as relating directly to 'jigsawing' and this anxiety reduction process is clearly seen by S's as being important by its position at the far side of the low anxiety situations dimension.

Returning to the individual threat situations, they appear to be more distinguishable from each other in comparison to other situations with other clusters. This result was pleasing to note because it proved the multi-functional ability of the FSJRQ to operate at two levels. At the first level, the FSJRQ was being sensitive enough to reveal and focus on individual strengths of reaction to and perceptions of the situations. The second level of operation was directed towards taking account of group similarities proving the overall homogeneity of the S's group.

Having a questionnaire that can operate at both levels giving data that can be analysed to discriminate statistically and provide meaningful results means that the 'gap' between the argument of individual differences versus situations is closed. It is more than clear that

the interactionist position is valid within the study of firefighters as an occupational group and that the complexity of the processes can be measured by the FSJRQ independently, as the questionnaire is not 'based' or 'fixed' to any particular concept. This, it is felt, is its strength as it is neither state or trait driven which gives it the 'neutral bias' that any questionnaire needs if it is to be effective and sensitive to what it is trying to measure.

The dimensions on both the reactions and situations produced by ALSCAL indicated that the nature of anxiety is both multidimensional and multi-faceted and this is the main assumption of the interactionist model. The interactionist model of anxiety focuses on a different hypothesis in that it predicts that significant interactions occur when traits and states that threaten an individual are congruent and that no interactions occur when traits and states are not congruent. The latter is important as it refers to 'negative' evaluations such as those which place some situations in the low anxiety point of the dimension. It is these 'negative' evaluations that highlight the situations which are most likely to be linked to coping processes such as jigsawing and the like. These processes are important and are found at the low anxiety point of the dimension not only because they are perceived as being low anxiety situations <u>per se</u> but used as a strategy to keep stress and anxiety to a minimum.

Individuals may, in the main, determine their own behaviour and therefore their individual reactions to situations. However, it seems clear that their behaviour and reactions to occupationally specific situations are more likely to be a product of the training they receive in order to induce the same reaction to the same or similar situation. One of the main questions to come out of this study is how far does prior experience of a situation affect the reactions to that situation? Redfield & Stone (1979) found that there were no differences between students ratings when comparing two groups who had and had not previously experienced a stressful event. Payne et al (1982) tested a similar hypothesis but their results were equivocal although the general finding was that those who had not experienced a situation tended to rate it as more stressful. Payne et al also found that the result was hard to assess because the effect did not appear to occur consistently across all situations and no patterns could be determined from the situations where the effect was found. This result could of course have happened because of the heterogeneity of their subject sample. However, they suggested that to further study the effect then maybe new recruits to an organisation or those recently transferred or promoted could be examined on their reactions to new situations and compared to a group of individuals who had already experienced those situations.

An intuitive guess at the result of such a study would be that experiencing a situation would lead eventually to the development of coping strategies which would in turn lead to a reduction in anxiety. However, the present study seems to indicate that experience of situations (all S's in the study had experienced every situation) may reduce anxiety slightly but there seems to be no significant difference in the reduction of anxiety beyond a certain point of experience. In other words, there seems to be a point when high anxiety provoking situations remain so to the individual no matter how experienced the individual is and presumably how many times the situation is experienced.

This effect has been discussed in Chapter 3 where it was reported by experienced firefighters that there was a phasic response in terms of anxiety felt for each emergency call they attended. This patterning or response was similar to that found by Halse et al (1978) in army parachute trainees who predicted a phasic response to each jump although the tonic gradients decreased (without disappearing altogether) with time and experience. There is therefore a 'fall off' point when coping strategies cannot help further the reduction in stress and anxiety levels. Alternatively, the anxiety may be facilitative and be a necessary strategy for coping with an event or situation.

Two of the research questions that the above

explanation begs are, firstly, does experience really affect the strength of reactions to situations? and secondly, when does the 'fall off' point occur, or conversely, when and how are the coping strategies fully learnt?

The flaw in Payne et al's (1982) call for comparative analyses between different groups is that the methodology still uses data gathered from a cross sectional slice at a particular point in time. A longitudinal study of a group of inexperienced individuals as they encounter situations and gradually gain experience may have some merit, especially if they are not only compared to themselves and to others within their group but also with a 'time slice' of already experienced individuals. The call for longitudinal studies has gone unnoticed for some time but gradually there seems to be a realisation that studies of stress and anxiety need this longitudinal base. Cooper, Watts, Baglioni & Kelly (1988) recognised this in an occupational study of dentists and Burke (1988) acknowledged that significant developments in work stress research may include the increasing use of longitudinal field studies, together with complex longitudinal research designs. These longitudinal research designs need to use what Bailey & Bhagat (1987) term the multi-method approach to ensure the robustness of the research design. Frese & Zapf (1988) discussed the problems of longitudinal research studies illustrating this with a particular

study. Part of their summary addressed the issues of time and they felt that a more detailed conceptualisation of the time component in research on stress at work was needed. An explanation of the time frame is easily done in an occupational setting by asking those who are to be researched what their particular conceptualisation of time is vis-a-vis their work. This is important as the main premise must be how people conceptualise time in terms of their own experiences and their own and their imposed timetables, both socially and occupationally. It is felt here that the 'secret' to any future longitudinal research must be to 'hang' the research on these time slots marked within a career or occupation.

Frese & Zapf (1988) also suggested that we should look at the times when work stressors have their first impact and this entails research with those who have just started work. They further suggested that a longitudinal study should sample frequently early on slowing down as time increases. This type of design, together with a multi-method approach seems appropriate in the continued study of occupational stress in firefighters.

As stated above, the present study was a cross-sectional analysis of firefighters careers and the data and its analysis does not really answer fundamental questions about whether behaviour changes significantly with experience. If those changes are subtle enough not to be picked up by the present study, can we hypothesise

that changes do occur in the first year? which is the most formative 12 months of a firefighter's career, and are the strategies for coping adopted and adapted within that longitudinal time span?

A longitudinal research programme would provide a further test of the behavioural characteristics of the individual to see if they are indeed fixed traits or whether they can change significantly with experience. Indeed, the data gathered may even prove whether firefighting attracts or facilitates the self selection of Type A people into the occupation.

The significance that events or situations have for the group or to individuals may change over time as they are first experienced and then experienced more often in time. A longitudinal study of recruit firefighters would be able to discern if there are any changes in the strength of reactions to the events which change over time. The interactionist position may be tested with longitudinal data to study how the interrelationship of time, situational specificity and cross situational consistency acts on the individuals. Of course the main research question would relate to the prediction or otherwise of the interaction effect caused by time being significant.

6.10 Conclusions

It has been shown in the present study that although individual differences affected the S's reactions to

certain situations, there appeared to be an overall homogeneity factor at work which meant that a taxonomy of situations emerged which were reaction based and could be divided into various groups which were more or less anxiety provoking.

There was strong support for the interactionist model and the ALSCAL showed the multidimensional nature of anxiety. Experience seemed to affect S's strength of reactions to situations and the group perceived situations similarly (situational specificity) rather than as individuals (cross situational consistency).

A longitudinal study using a multi-methodological approach with the mainstay of the study being the FSJRQ would mean that the conceptual framework of occupational anxiety in firefighters could be more rigorously studied and provide a continuous 'picture' of how firefighters develop and how their anxiety levels and perceptions change, together with their strength of reactions to situations over time and with experience.

CHAPTER 7

7 RECRUIT FIREFIGHTERS - SITUATIONS, REACTIONS AND INTERACTIONS : A LONGITUDINAL STUDY

7.1 Introduction

The cross-sectional study described in the previous chapter, which gathered data from a single time point from experienced firefighters, supported the interactionist position that behaviour is determined by the interaction between situations and individual reactions. It was also clear from the study that the consistency of reactions by the various groups of experienced firefighters who formed the subject population reflected an occupational homogeneity. This resulted in a taxonomy of situations in terms of the reactions they elicited. This taxonomy could be divided into various groups dependent upon how anxiety provoking they were to S's. The taxonomy of situations divided itself into four distinct clusters:-

i) individual threat

ii) self competency

iii) operational role determined

iv) routine

An occupation which in many ways is similar to that of firefighters is the police service. In a number of studies into stress in police officers, (Cox, 1987; Davidson & Veno, 1980; Gudjonsson, 1984; Terry, 1981) the authors concluded that police officers categorised stressful situations that they experienced into similar

clusters e.g. 1) individual threat :- threatening situations, physical danger etc, 2) self competency :- fear of failure, being criticised, making mistakes etc, 3) operational role determined :- job overload, unpleasant duties, dead people etc, and 4) routine :- job underload etc. Similar stressful situations have also been classified by search and rescue workers (Paton, 1989, 1990; Taylor & Frazer, 1982).

All subjects in the previous study were experienced firefighters and experience was found to be a major determinant of reactions to situations. There was also an homogeneity formed within the S's occupational group. It is therefore important to attempt to find out how experience (in terms of time) affects the strength and patterning of reactions to occupational situations. In other words, what happens over time to individual S's and also groups of S's as they become experienced.

Payne et al (1982) touched upon these issues of how experience affects situational reactions in groups of individuals by proposing that new recruits to an organisation or others who have been newly promoted or transferred could have their results from a job reaction questionnaire compared to those from a group who have already experienced those situations. This proposition is not sensitive to how the inexperienced group becomes experienced as it would still use cross-sectional data in the resulting comparative analysis. In order to research

such a proposition which takes account of the acquisition of experience by recruits or individuals newly appointed or transferred to a position, it is necessary to move away from the 'time-slice' methodology to one that collects the data over a period of time using the same S's. The data thus gathered could then be analysed and compared not only within and between S's but also with groups who are already experienced. Cherry (1978) noted that the difficulties of interpreting data on stress at work could be much reduced by the adoption of a longitudinal approach.

7.1.1 The Longitudinal Approach

A longitudinally designed study, because of its dynamism may be sensitive to changes in the reactions of firefighters that occur over time whilst they gather experience. It could therefore act to reduce the problems that are found with cross-sectional (time-slice) studies such as insensitivity to changes and also the 'empirical validation of causal influences' (Frese & Zapf, 1988).

A large number of longitudinally designed studies in occupational stress and anxiety have tended to focus on the interaction of stressors on individuals or groups as a determinant of breakdown leading to ill-health or dysfunction. If not a direct outcome, then ill-health and/or dysfunction has been included as one of the major outcomes that have been hypothesised in different theoretical and conceptual models that have been proposed

e.g. Cherry (1978); Frese & Mohr (1987) ; Menaghan & Merves (1984); Warr & Jackson (1984,1985). Cooper et al (1988) studied occupational stress amongst general practice dentists and concluded that there was a need to use longitudinal research designs using the same types of conceptual framework discussed above to determine the effect of job stressors on health. Brenner et al (1985) in a longitudinal study of teacher stress and coping again used the longitudinal data to test their conceptual core model of the teacher stress process. The outcomes of their proposed model were measured in terms of psychological or physiological dysfunction.

Brenner et al (1985) recognised that they failed to include coping (as well as social support) within their core model due to the lack of theoretical understanding of these issues. Nevertheless, they postulated a two phase approach to stress, the first phase being short term where evaluation and reaction to potentially harmful situations takes place. This they described as coping requiring the use of all the individual's resources that are available leading to enduring consequences for the environmental fit. The second phase was described as an intermediate to long term time period of slow processes of adaptation which if unsuccessful led to dysfunction.

Although dysfunction and ill-health are undeniable outcomes of anxiety in certain cases, it could be argued

that this type of outcome only accounts for a small percentage of total outcomes. Too much concentration on these concepts in occupational stress and anxiety research has meant that little attention has been paid to the processes that occur in the greater percentage of situations where coping is achieved satisfactorily. Dysfunction is not a feature of the present study or the previous ones per se, although it was recognised that it should not be ignored. Data on the general health of S's who took part in the study was therefore gathered and analysed as part of the multi-methodological measurement approach.

At a superficial level, Brenner et al's (1985) study and statement regarding coping and adaptation seemed not to be relevant to the present study but at a deeper level there were certain similarities to the findings of the previous study and parallels could be drawn. An example of this is where it was found that experience of a situation led to the adoption of coping strategies (similar to Brenner et al's first phase) with a gradual lowering of anxiety being reported by S's as experience was gained (Brenner et al's second phase). The concept of competency proposed in the previous study may very well be synonymous with adaptation. The distinction may therefore be due in part to the choice of terms, models and concepts used but more probably due to the occupational specificity of such studies. However it does show that studies of

this kind may not be mutually exclusive other than the concentration on dysfunctional outcomes as discussed above.

Frese & Zapf (1988) in their paper on methodological issues in the study of work stress discussed two models of stress effects. Again, they concentrated on dysfunction and ill-health outcomes but their overall conceptualisation of these stress effect models are important because they can be adapted into a generalised model that can encompass, in part, the present study. The models that they postulated distinguished two kinds of basic causal conceptualisations. The first was the 'exposure time effect' which simply stated that the longer the exposure to a stressor the higher the likelihood of ill-health. Several variants of this model were proposed:-

i) The stress reaction model where it is suggested that the continued impact of a stressor increases in experienced severity over time leading to dysfunction, but that if the stressor is removed then there is a recovery effect.

ii) The accumulation model where ill-health is the resultant of the accumulation of stress and there is no recovery.

iii) The dynamic accumulation model which differs from the accumulation model in that the

amount of dysfunction in the latter reaches an asymptotic level whereas the dynamic model shows a continuous rise in dysfunction even after the stressor has been removed, although the steepness of gradient of the upward curve will reduce over time.

iv) The sleeper effect model where dysfunction occurs a long time after the stressor has been experienced.

v) The adjustment model which is similar to the stress reaction model but differs in its time course. The assumption of this model is a longer increase time of dysfunctioning until coping strategies (adjustment) takes place.

Freze & Zapf's second model was the 'initial impact' model which would be more prevalant where an individual had started a new occupation or encountered a new stressor. The effect is reduced once coping strategies, job skills and competency are learnt or gained. Ignoring the purported outcomes of these two models and their variations, the main difference is the time scale over which they occur. Naturally, the initial impact model implicitly assumes a short 'time-frame' whilst the exposure-time model implies a lengthy 'time-frame'. Both models could be researched by longitudinally designed studies in their own right, but it could be argued that

there is no mutual exclusivity between the two models and that a combination of them could provide a useful framework for a longitudinal analysis which sampled frequently during the early stages i.e. the initial impact stage, and then less frequently in the time exposure stage.

Providing the full length of the study was carefully calculated, then the capture of the data using such frequency sampling should provide useful insights into how reactions to situations, especially those that are stressful, change over time as experience is gained and coping strategies, job skills and competencies are gained.

Time frames for previous longitudinal studies on stress and anxiety have ranged from weeks to years with the time period being chosen by the researcher to fit the research model being used. Some of these studies have been occupationally specific. For example Cherry (1978) in research on stress and anxiety across all the S's occupations used part of the data of a longitudinal study carried out by Douglas (1976) which sampled S's from birth every two years up to the age of 26. Keenan & Newton (1987) used data from two time points over a four year period in their study of work difficulties and stress in professional engineers.

The choice of time variables in a longitudinal study of occupational stress and anxiety is a difficult task and must be dependent upon the occupation itself and the

variety of work experience that needs to be gained within the specific occupation being studied. Frese & Zapf (1988) noted that it would be useful to start studies at a point where stress and anxiety would be experienced for the first time e.g. where people start a new job. It must be presumed that a person will be anxious about the thought of a stressful situation before it is experienced. It would therefore be useful if any such study took account of anticipatory reactions before a person actually experiences a stressful situation, either in practice or for real.

In the case of firefighters, the job start is a twelve to sixteen week residential recruit training course where they are taught not only the basic job skills but also to adjust their behaviour and responses to stressful and therefore anxiety provoking situations, some of which will be potentially life threatening. This type of training regime is meant to prepare them for the real life dramas they will encounter when they go 'operational'.

Training programmes of this type which help to modify behavioural dispositions and reactions to situations are seen by Motowildo et al (1986) to be an important strategy in reducing anxiety and to assist in building coping strategies in order that stressful situations experienced are not likely to provoke strong reactions. In other words, how does the percentage of variance attributed to both S's and situations vary with experience gained over

time?

The present study follows Frese & Zapf's (1988) suggestion that an ideal field study should sample at the beginning in short time waves gradually extending the time frame between sampling. They also give an example being two to three waves within the first three months and then every three months up to eighteen months. The first three months time frame suggested fits exactly into a firefighters recruits course. The next time-frame chosen for the present study was up to the completion of twelve months service.

By this time, firefighters have been 'operational' for nine months and during this period, the majority should have experienced all the situations listed within the Fire Service Job Reaction Questionnaire (FSJRQ) which was used in the previous study. Twelve months service is also a significant time point in a firefighters career because it is at this juncture that they normally receive their first test of acquired skills and they are then reported upon. These two factors were therefore significant in the choice of the time-frame for the longitudinal study although the actual test of acquired skills would not be administered at the same time as the FSJRQ and there would therefore be no interference between the two.

7.1.2 Individual Characteristics

The present study also provided an opportunity to

gather data longitudinally on individual characteristics. The measures used were Type A behaviour and Rotter's (1966) Locus of Control. Also, the general mental health of subjects was assessed, again over the longitudinal time frame using Goldberg's (1972) General Health Questionnaire (GHQ).

7.1.2.1 Type A Behaviour

The general theory of Type A behaviour (Rosenman et al, 1970) has been outlined in the previous study (Chapter 6) and it is proposed as a behavioural characteristic that posseses certain personality traits, which should show stability over time. Friedman & Rosenman (1974) see Type A behaviour as an action-emotion complex elicited by environmental events i.e. situations. This theory neatly combines both fixed trait characteristics and changing events that a person experiences into an interactional perspective. However, Powell (1987) noted that a complete specification for Type A behaviour was likely to be complex because of the interaction between the characteristics of behaviour patterns and the characteristics of events that elicit Type A behaviour. Powell suggested that the conceptualisation of the complexity of the interactions may not be necessary to the task of measurement as Type A behaviour operationalisation is a simple task, an individual who has these characteristics is therefore Type A or the characteristics are not exhibited and therefore is Type B.

Powell (1987) also commented on the assumptions accepted by the vast majority of Type A behaviour studies that the behavioural trait characteristics are stable over time. However, she further stated that there were so few studies that have carried out a full assessment on the long term stability of measures of Type A behaviour that these types of assumptions are violate.

Davidson & Veno (1980) in their study of stress in police officers (an occupation similar to firefighters in many ways) questioned whether the occupation either attracted Type A people or facilitated Type A behaviour. They concluded that the issue required more research and that the answer might be solved by sampling new recruits with Type A behaviour questionnaires.

In Cooper & Payne (1988) Payne asked the question whether individual differences played a role in selecting individuals into jobs of differing stressfulness. The process whereby persons remain in their chosen occupation is termed 'self selection' as they are the ones who have the ability to cope with the stressfulness of the job. Payne (1988) noted that studies of occupational stress have not recognised or taken account of the role of individual differences or behavioural type variables due to the vast majority of these studies using data gathering methodologies over 'time-slices' or over periods that are too short to capture any changes in individual or personality characteristics or traits.

The present longitudinal study provides a means of gathering Type A behaviour data on the S's taking part in the study. Although the proposed time-frame of the study was only twelve months, it could be that the data gathered would provide some insights, firstly into the question posed by Davidson & Veno (1980) and Payne (1988) on individual selection and attraction to certain stressful occupations, and secondly into any changes in behavioural characteristics over the time-frame. Any changes to the stability of behavioural characteristics or patterns over time might be expected to be caused by situational effects because of the change of career and its consequent alterations of life style and the individuals experiences. Even though the measurement scales used for Type A behaviour are not situationally based, the interactions of all these variables may in turn interact with behavioural characteristics to produce some form of change in them.

Payne (1988) also questioned how individual differences affected or were related to development of symptoms of psychological strain. A number of studies in psychological stress/strain e.g. Keenan & McBain, (1979); Burke, (1984) have found no relationship between Type A behaviour and reported well-being, whilst others (Matteson, Ivancevitch & Smith, 1984; Kelly & Houston, 1985) have found that such relationships do exist. The findings are therefore equivocal and again, the present study allows an opportunity to use a measure of recent

symptomatology in the form of Goldberg's (1972) General Health Questionnaire (GHQ) for a comparative analysis with Type A behaviour results.

7.1.2.2 The Locus of Control Scale

Powell (1987) writes that Type A behaviour and its categorisation does not necessarily form the best method of evaluating individuals. Another form of measurement of individual characteristics and differences is Rotter's (1966) Locus of Control Scale. The Locus of Control Scale is a measure of individual's perceptions of control over their environment. The scale is situationally (event) based and it is a measure of the degree to which an individual believes that such environmental situations and events are within his/her personal control or whether they are controlled by fate, luck, chance or powerful others. Internals according to the scale are low scorers and are thought to perceive environmental factors as being under their own control and engage in behaviour that seeks to master the environment. Externals (high scorers) on the other hand are thought to feel helpless in an environment where events are outside their own control. Sarason & Sarason (1987) in their paper on the importance of cognition and modular variables in stress stated that there was considerable evidence that the Locus of Control measurement reflected individuals perception of their own control over environmental events and that experiencing life changes may affect their feelings of control,

increasing the External's scores and leading to anxiety.

If some individuals are more anxious when they perceive themselves as not having any or little control over events then it could be argued that for a career change (life events) and the experiencing of situations that an individual would encounter as a firefighter, an External in Locus of Control orientation would feel more helpless and anxious as the career progresses. The counter to this is that training, experiencing situations, coping and adaptation processes should lead in some complex way to competency which can be described as control of events and situations. It could therefore be predicted that Externals would reduce their tendency to be External whilst Internals would show no change.

7.1.3 Coping in Terms of Individual Characteristics

A large amount of research has focussed on coping in terms of stable individual characteristics and their impact on the coping process (Friedman & Rosenman, 1959; Rotter, 1966; Glass, 1977; Lefcourt, 1985) using the assumption that those individuals who show certain characteristics are better able to cope and therefore they do not suffer dysfunction. However, Cohen & Edwards (1988) found little evidence to support that this was indeed the case. Edwards (1988) categorised skills, abilities and personal characteristics which were relevant to the coping process. Edwards argued that these skills, abilities and personality traits were relatively stable

but that their impact on anxiety was highly variable and dependent upon the specific demands of the coping strategy adopted. What is not clear is how stable personal characteristics really are. As most studies have concentrated on the effect of these 'stable' characteristics on coping, stress and anxiety there has been little research done on the reverse effect i.e. the effect of coping and experiencing situations on personal characteristics, especially personality traits.

7.1.4 The Longitudinal Study of Recruit Firefighters

The present study was a longitudinal design in order to determine how the gathering of experience by recruit firefighters might affect their reaction to both stressful and non-stressful situations. The (FSJRQ) was adapted from Payne et al's (1982) Job Reaction Questionnaire. The FSJRQ offered a data gathering technique which could readily fit into a longitudinal framework using a combination of Frese & Zapf's (1988) causal conceptualisation models of initial impact and time exposure. With this methodology and research design it would be possible to produce data that could give useful insights into how reactions to situations, both anxiety provoking and otherwise, changed over time. It was expected that the study would also provide useful insights into whether homogeneity amongst firefighters as an occupational group (a finding of the previous study) would be achieved during the time-frame of the longitudinal

study. It would also be of importance to determine in the light of the previous study whether the interactionist position was supported or whether situational specificity or cross situational consistency were singularly of relevance and influencing the reactions of recruit firefighters to the situations presented on the FSJRQ.

It was further hoped that the present study would provide a means of gathering and capturing data on individual characteristics using Type A behaviour and Locus of Control measurements. Gathering this type of data longitudinally and within an occupationally specific subject population may provide some answers to the notion of attraction of certain behavioural types to certain occupations as well as occupations facilitating certain types of behaviour. Also, insights may be gained into the stability of personality characteristics over time or, if this is not the case, the detection of changes in those characteristics in which case it could be postulated that the cause may be the situational effect. Alternatively, the causes could be due to the complex interaction between experience, reactions and situations with behavioural characteristics. There would also be some worth in searching for any correlations between the two measures used to see if they aligned in any way as well as correlating each measure over time to test for stability.

Finally, the chance to use a measure of recent symptomatology (GHQ) was used to explore any relationships

or interrelationships that could exist between the personality characteristic measures and reported well being both at the start and finish of the longitudinal study time-frame.

7.2 Method

7.2.1 Subjects

68 recruit firefighters embarking on their career in the fire service made up the subject sample. The sample was taken from two fire brigades in Gt. Britain, 37 subjects from Hertfordshire Fire Brigade and 31 from Greater Manchester County Fire Service. Although recruitment as described in Chapter 2 is more or less standardised throughout Gt. Britain, the two brigades chosen for the subject sample represented a fair cross section of fire service experience in terms of contrasting risks. Hertfordshire based adjacent to London and forming one of the 'Home Counties' contains small and medium sized towns with large rural areas serviced by main arterial roads throughout the county. It is also known as a commuter belt for London and is perceived as an economically thriving county.

Greater Manchester is a large metropolitan area with a large industrial base and massive urban 'sprawl' containing many large towns in their own right e.g. Bolton, Stockport, Rochdale, Bury, Oldham etc. Consequently, the area covers minimal rural risk whilst serving a population which varies in socio-economic status

from true urban squalor to plush suburban residential belts. The area is criss-crossed by main roads and motorways and contains an international airport.

Out of the total of 68 subjects, 5 (7.35%) resigned from the service. All of these resignations came whilst the recruits were in the first few weeks of their recruit training course.

7.2.2 Data Gathering Methodology

7.2.2.1 Fire Services Job Reaction Questionnaire (FSJRQ)

The same FSJRQ from Chapter 6 was used as the main method of measurement in this study (see Appendix 6). The part of the FSJRQ which contained the column for subjects to report whether they had experienced each situation or not and to judge how they thought they would react to that situation (anticipatory reactions) was important to the longitudinal study not only in comparing the differences within subjects as to how their judgement changed with experience of the situations but also to show the general build up of their experience over time.

Subjects were asked to respond to the 23x8 matrix using a five point scale indicating the strength of each reaction made to each situation in turn i.e. working down the columns of the FSJRQ.

7.2.2.2 Type A Behaviour Questionnaire

All subjects were asked to complete the same Type A behaviour questionnaire as used in the previous study (see Appendix 7).

7.2.2.3 Locus of Control

Rotter's (1966) Locus of Control questionnaire was used containing 29 pairs of statements 6 of which were 'fillers' giving a score out of 23 for Externality. An example of the questionnaire is shown in Appendix 8.

7.2.2.4 General Health Questionnaire (GHQ)

The abbreviated 28 item GHQ (GHQ-28) was used covering 7 questions from each of the following scales:-

i) Somatic Symptoms
ii) Anxiety and Insomnia
iii) Social dysfunction
iv) Severe depression

Appendix 9 shows an example of the GHQ-28 used and subjects were asked to answer each question by circling or underlining the answer which they thought most nearly applied to them.

7.2.3 Procedure

The basis of the longitudinal study was time sampling over the 52 week period chosen for the study. It was decided that the time sampling would decrease in frequency as the subjects progressed towards the end of their first year of experience. The main reason for this was to 'capture' the high theoretical experience gain during their initial training period of 12 weeks whilst their operational experience should show a steady 'rate of capture' through the remaining 40 weeks.

For both fire brigades involved, a co-ordinator was

appointed to oversee the issue of questionnaires at the correct time and gather the completed questionnaires for onward transmission. The co-ordinators were briefed in the methods of completion of the questionnaires and the reasons for the study. They passed that relevant information to the subjects, including the fact that the study and questionnaires had nothing to do with the recruits individual careers, emphasising the need to complete all questionnaires throughout the study period. In addition, each questionnaire contained comprehensive instructions on its completion.

The time sampling periods for each questionnaire are set out in table 7.1. The FSJRQ was completed at each of the 7 samplings periods whilst the Type A behaviour, Locus of Control and GHQ were administered at the start and finish of the time sampling period.

All questionnaires were marked and collated on their return and entered into the data base ready for statistical analysis.

7.2.4 Subject Response to the Questionnaires

From the 68 subjects who started the study, 5 resigned from the service, all during their recruit training. 49 subjects (72.06%) completed both time samples of the Type A/B and Locus of Control questionnaires whilst 36 subjects (52.94%) completed the GHQ, 47 subjects (69.12%) completed the FSJRQ for all 7 time sampling periods. Of those 47 subjects a collation

TABLE 7.1 LONGITUDINAL STUDY - TIME SAMPLING PERIODS FOR EACH QUESTIONNAIRE

	WEEK 1	WEEK 2	WEEK 6	WEEK 12	WEEK 24	WEEK 36	WEEK 52
FSJRQ	*	*	*	*	*	*	*
TYPEA BEHAVIOUR	*						*
LOCUS OF CONTROL	*						*
GHQ	*						*

of the situation experienced or not column showed that after 52 weeks, only 11 (23%) subjects had not experienced all situations.

All 63 subjects that were asked to respond throughout the longitudinal study did so. The size of the non-response was due to some subjects failing to complete one or more of the various questionnaires. Throughout the initial recruit courses, a 100% return was achieved as the subjects could be sampled directly. However, once they were posted to their operational stations, the co-ordinators had to operate from a distance and meet the specific time-frame. This meant that subjects had to be contacted on their stations within the paticular time-frame and complete their questionnaire(s). Subjects did not respond, or responded too late to meet the time-frame deadline due to a number of valid reasons e.g. annual leave, detached duties, attendance at courses etc. and they were therefore not able to return their questionnaires within the time-frame required. It was therefore assumed that there were no differences between those subjects who responded and those that did not.

In order to ensure consistency, it was decided that only data from subjects who had completed the questionnaire for both time sample points for each of Type A, Locus of Control and the GHQ would be used. Similarly, only data from those subjects who had completed the FSJRQ for all 7 time sampling points was used.

7.3 Outline Hypotheses

The design of the present study containing large numbers of variables, differing data gathering techniques and the number of time samples did not readily lend itself to a true experimental structure. Therefore, there could not be any precisely defined hypotheses generated although two outline hypotheses were formulated and established in order to analyse, explore and probe the data.

The main outline hypotheses were:-

7.3.1 Outline Hypothesis 1

There should be significant changes occuring over the time sampling period in S's reactions to situations. These changes should show a decline in the strength of reactions to situations as experience is gained via training, experiencing situations, the learning of coping strategies and their adoption and adaption. There should therefore be a closeness of fit of subjects reactions x situations scores near the end of the longitudinal study.

If these changes do occur it should show that there is an homogeneity being formed and established within the subject group as strategies for coping are learnt and used. Experiencing situations should also cause a reduction in the strength of reaction to situations, this being counter to Redfield & Stone's (1979) findings that there was no differences in a student group between ratings of those who had and those who had not experienced a situation.

As the data was being gathered from the two fire brigades, this variable i.e. brigade, was added to see whether differences occured in the subjects because of the brigade they had been recruited by. The between subject design of the analysis should also show if there was an homogeneity of the overall group gained towards the end of the time sampling periods.

7.3.2 Outline Hypothesis 2

The previous study supported the interactionist model of anxiety and produced meaningful patterns between the interaction of situations and reactions. These patterns were used in the present study's statistical analyses together with the additional variable of time. This variable was introduced into the study to attempt a prediction as to whether the effect of time per se would be significant and whether the interactions of the grouped data covering the whole of the longitudinal study maintained the interactionist position.

Because the longitudinal study provides time sample data, the most important part of the analysis would be the comparison of the data in each time sample period. An examination of the data for each individual time sampling period compared to each other should provide a better insight into the interactionist position, and if this position is correct, then as subjects offset their individual traits by their gains in experience over time, then the interaction effects should become more prominent.

Through the two main outline hypotheses postulated the comparisons mentioned above were tested and explored to provide an interpretation of the results.

For the data gathered on Type A behaviour, Locus of Control and GHQ no specific or outline hypotheses were formulated. However, this data was subjected to statistical analyses in order to explore and tease out any relationships and inter-correlations that existed both between and within themselves and the FSJRQ data. In this way it was hoped that without the constraints of rigid hypotheses there would be a 'looser' and more open exploration of the data. This freedom to move within the data without such constraints should provide useful insights into relationships and differences in such areas as trait stability over time, the notion of occupational self selection by personality type, personality type and reported symptomatology and reported reactions to situations.

7.4 Statistical Analyses

All statistical analyses were carried out on the data using SPSSx together with the Supastat computer package devised by R. Eglen.

7.4.1 Configuration of the data

The data from the FSJRQ produced completed sets for 47 subjects which were coded for the two brigades taking part in the study.

SPSSx was used on the raw data to reduce it into the

clusters/categories that were defined by the ALSCAL multidimensional scaling carried out in Chapter 6.

The ALSCAL analysis showed that the raw data could be arranged according to categories. These categories were:- from the 8 original reactions:-

1) emotional arousal reactions
2) autonomic reactions
3) inadequacy reactions

and from the original 23 situations:-

1) individual threat situations
2) operational role determined situations
3) routine situations
4) self-competency situations

This reduction transferred the data from an 8 X 23 design to a 3 x 4 data matrix. The longitudinal time dimension gave 7 time sampling periods to produce a final data matrix of means in a 3 x 4 x 7 configuration.

Once the data was configured in this way the analyses of variance were carried out for each brigade seperately.

7.4.2 Analysis of Variance (ANOVA)

The first ANOVA was used on the data across all measures for all time periods using a within subject repeated measures design. The second ANOVA was a split-plot design and was used to analyse the data for each time period seperately. The between subject variable in this ANOVA was brigade. Because of the use of the between subject variable, and the uneven number of cases for each

brigade (24 to 23) a case from Hertfordshire Fire Brigade was dropped using random number procedure.

7.4.3 Correlations

The Pearson product-moment correlation was used for all correlations and intercorrelations using two tailed significance levels.

7.4.4 t-Tests

The t-Test (paired samples) using two tailed significance levels was used to analyse the data on Type A behaviour, Locus of Control and the GHQ.

7.4.5 General Statistics

The Supastat programme also produces a table of general statistics which include:-

i) Minimum-maximum values
ii) range
iii) mean
iv) variance
v) standard deviation
vi) median
vii) quartile deviation

These statistics were for the raw data of Type A behaviour, Locus of Control and the GHQ.

7.5 Results

7.5.1 The Effects of the Variables, Brigade, Time, Reactions and Situations

Tables 7.2 and 7.3 are the summary tables for the ANOVA for all the longitudinal data for both brigades.

TABLE 7.2 SUMMARY TABLE OF ANALYSIS OF VARIANCE FSJRQ LONGITUDINAL DATA (SITUATIONS, REACTIONS AND TIME)HERTS. FIRE BRIGADE

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	230.81		23				
WITHIN Ss TOTAL	874.14		1992				
PERIOD		35.85		6	5.97	6.20	<0.001
PERIOD ERROR		136.97		138	0.99		
SITUATIONS		256.34		3	85.45	60.39	<0.001
SITUATIONS ERROR		97.62		69	1.41		
REACTIONS		49.73		2	24.86	35.91	<0.001
REACTIONS ERROR		31.85		46	0.69		
PERIOD X SITS.		6.69		18	0.37	1.89	<0.05
PER X SITS ERROR		81.40		414	0.20		
PERIOD X REACT.		4.56		12	0.38	3.12	<0.001
PER X REACT ERROR		33.61		276	0.12		
SITS X REACT.		63.38		6	10.56	46.70	<0.001
SITS X REACT ERROR		31.22		138	0.23		
PER X SITS X REACT.		4.80		36	0.11	0.22	NS
PER X SIT X REAC ERR		40.84		828	0.50		
TOTALS		1104.95		2015			

(N=24)

All the main effects are significant as well as the interactions with the exception of period x situation x reaction. This was the same for both brigades. The matrix of mean scores provided by the ANOVA was used to produce Figures 7.1, 7.2, 7.3, 7.4, 7.5 and 7.6. Figures 7.1 and 7.2 show the situation means over the seven time periods for each brigade. The patterning is remarkably similar for periods 5, 6, and 7 (these periods are when S's have been posted to stations and become fully operational). There were still similarities in the other time periods and those differences that were noted could have been due to methods of instruction and curriculum adopted through the initial training phase. Figures 7.3 and 7.4 show the overall reaction means by situation. Again there was a close fit between the two brigades except for situation 3. All the figures show that there seems to be some agreement between S's on their perceptions of which situations were stressful. Tables 7.4, 7.5, 7.6, 7.7, 7.8, 7.9 and 7.10 are the ANOVA summary tables for the variables brigade, situations and reactions for each time period. The between variable was brigade. Table 7.11 and Figure 7.7 show the ANOVA means for each time period.

The brigade variable shows that there was significant differences between the S's throughout the initial training period, these differences being significant for weeks 1, 6 and 12 at $p<0.001$ level whilst week 2 showed at $p<0.025$ level. The differences between the two brigades

TABLE 7.3 SUMMARY TABLE OF ANALYSIS OF VARIANCE FSJRQ LONGITUDINAL DATA (SITUATIONS REACTIONS AND TIME) GMC FIRE SERVICE

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	193.43		22				
WITHIN Ss TOTAL	1002.73		1909				
PERIOD		89.45		6	14.91	21.70	<0.001
PERIOD ERROR		93.40		132	0.71		
SITUATIONS		331.14		3	110.38	104.72	<0.001
SITUATIONS ERROR		69.57		66	1.50		
REACTIONS		69.75		2	34.88	32.35	<0.001
REACTIONS ERROR		47.44		44	1.80		
PERIOD X SITS.		14.61		18	0.81	4.58	<0.001
PER X SITS ERROR		70.19		396	0.18		
PERIOD X REACT.		9.42		12	0.78	4.94	<0.001
PER X REACT ERROR		41.91		264	0.16		
SITS X REACT.		87.63		6	14.61	63.79	<0.001
SITS X REACT ERROR		30.22		132	0.23		
PER X SITS X REACT.		4.74		36	0.13	0.26	NS
PER X SIT X REAC ERR		43.25		792	0.50		
TOTALS		1196.16		1931			

(N=23)

TABLE 7.4 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 1 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	77.1		45				
BRIGADE		15.87		1	15.87	11.24	<0.001
BRIGADE ERROR		62.12		44	1.41		
WITHIN Ss TOTAL	307.79		506				
SITUATIONS		109.21		3	36.4	89.22	<0.001
SITN X BRIG		2.41		3	0.80	1.97	NS
SITN X BRIG ERROR		53.86		132	0.41		
REACTIONS		41.2		2	20.6	69.16	<0.001
REACT X BRIG		5.34		2	2.67	8.97	<0.001
REACT X BRIG ERROR		26.21		88	0.3		
SITN X REACT		42.55		6	7.9	79.0	<0.001
SIT X REACT X BRIG		0.31		6	0.5	5.00	<0.001
SITXREACTXBRIG ERROR		26.68		264	0.1		
TOTALS		385.78		551			

TABLE 7.5 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 2 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	118.1		45				
BRIGADE		15.82		1	15.8	6.75	<0.025
BRIGADE ERROR		103.17		44	2.34		
WITHIN Ss TOTAL	224.13		506				
SITUATIONS		88.55		3	25.9	85.14	<0.001
SITN X BRIG		2.32		3	0.77	2.23	NS
SITN X BRIG ERROR		45.76		132	0.35		
REACTIONS		19.49		2	9.74	36.32	<0.001
REACT X BRIG		1.68		2	0.84	3.12	NS
REACT X BRIG ERROR		23.61		88	0.27		
SITN X REACT		6.3		6	3.57	4.46	<0.001
SIT X REACT X BRIG		0.57		6	0.1	0.125	NS
SITXREACTXBRIG ERROR		20.71		264	0.8		
TOTALS		343.12		551			

TABLE 7.6 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 6 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	115.68		45				
BRIGADE		32.42		1	32.42	17.13	<0.001
BRIGADE ERROR		83.27		44	1.89		
WITHIN Ss TOTAL	189.15		506				
SITUATIONS		71.71		3	23.9	77.44	<0.001
SITN X BRIG		2.35		3	0.78	2.54	NS
SITN X BRIG ERROR		40.74		132	0.31		
REACTIONS		15.57		2	7.79	36.52	<0.001
REACT X BRIG		0.97		2	0.48	2.26	NS
REACT X BRIG ERROR		18.77		88	0.21		
SITN X REACT		20.3		6	3.34	4.77	<0.001
SIT X REACT X BRIG		0.92		6	0.15	0.21	NS
SITXREACTXBRIG ERROR		18.8		264	0.7		
TOTALS		304.83		551			

TABLE 7.7 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 12 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	89.58		45				
BRIGADE		29.32		1	29.32	21.41	<0.001
BRIGADE ERROR		60.26		44	1.37		
WITHIN Ss TOTAL	176.94		506				
SITUATIONS		61.3		3	20.34	76.56	<0.001
SITN X BRIG		2.77		3	0.92	3.47	<0.025
SITN X BRIG ERROR		35.7		132	0.27		
REACTIONS		13.27		2	6.64	27.45	<0.001
REACT X BRIG		1.3		2	0.65	2.69	NS
REACT X BRIG ERROR		21.27		88	0.24		
SITN X REACT		17.8		6	2.97	3.3	<0.01
SIT X REACT X BRIG		0.66		6	0.11	.012	NS
SITXREACTXBRIG ERROR		23.77		264	0.9		
TOTALS		266.52		551			

TABLE 7.8 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 24 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	95.4		45				
BRIGADE		13.3		1	13.3	6.96	<0.025
BRIGADE ERROR		82.37		44	1.87		
WITHIN Ss TOTAL	233.3		506				
SITUATIONS		106.4		3	35.35	89.36	<0.001
SITN X BRIG		1.51		3	0.5	1.27	NS
SITN X BRIG ERROR		52.21		132	0.4		
REACTIONS		10.3		2	5.15	21.77	<0.001
REACT X BRIG		1.75		2	0.87	3.69	<0.05
REACT X BRIG ERROR		20.81		88	0.24		
SITN X REACT		20.93		6	3.49	4.98	<0.001
SIT X REACT X BRIG		0.83		6	0.14	0.2	NS
SITXREACTXBRIG ERROR		18.93		264	0.7		
TOTALS		328.7		551			

TABLE 7.9 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 36 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	127.1		45				
BRIGADE		8.44		1	8.44	3.11	NS
BRIGADE ERROR		119.56		44	2.72		
WITHIN Ss TOTAL	203.36		506				
SITUATIONS		87.1		3	29.3	84.16	<0.001
SITN X BRIG		2.73		3	0.91	2.64	NS
SITN X BRIG ERROR		45.54		132	0.34		
REACTIONS		10.1		2	5.1	20.6	<0.001
REACT X BRIG		1.15		2	0.58	2.31	NS
REACT X BRIG ERROR		21.95		88	0.25		
SITN X REACT		15.65		6	2.61	3.74	<0.001
SIT X REACT X BRIG		0.93		6	0.16	0.23	NS
SITXREACTXBRIG ERROR		18.29		264	0.7		
TOTALS		331.36		551			

TABLE 7.10 SUMMARY TABLE OF ANALYSIS OF VARIANCE OF BRIGADE,SITUATIONS AND REACTIONS AT WEEK 52 (N=46)

SOURCE OF VARIANCE		*SS*		*DF*	*MS*	*F*	*Sig.*
BETWEEN Ss TOTAL	103.27		45				
BRIGADE		2.61		1	2.61	1.14	NS
BRIGADE ERROR		100.66		44	2.29		
WITHIN Ss TOTAL	182.83		506				
SITUATIONS		62.76		3	20.92	58.55	<0.001
SITN X BRIG		2.7		3	0.69	1.94	NS
SITN X BRIG ERROR		47.17		132	0.36		
REACTIONS		8.59		2	4.3	15.51	<0.001
REACT X BRIG		0.1		2	0.1	0.2	NS
REACT X BRIG ERROR		24.37		88	0.28		
SITN X REACT		13.2		6	2.2	2.44	<0.05
SIT X REACT X BRIG		0.33		6	0.5	0.59	NS
SITXREACTXBRIG ERROR		24.33		264	0.9		
TOTALS		286.1		551			

TABLE 7.11 TABLE OF MEANS FOR BRIGADE, REACTIONS AND SITUATIONS FOR EACH TIME PERIOD

	WEEK 1	WEEK 2	WEEK 6	WEEK 12	WEEK 24	WEEK 36	WEEK 52
B1	2.343	2.259	2.126	2.123	2.070	1.987	1.923
B2	2.683	2.598	2.611	2.584	2.378	2.234	2.060
S1	2.863	2.678	2.627	2.564	2.549	2.381	2.212
S2	2.909	2.810	2.660	2.661	2.684	2.551	2.376
S3	2.483	2.457	2.423	2.396	2.099	1.990	1.883
S4	1.798	1.770	1.764	1.804	1.564	1.519	1.495
R1	2.492	2.419	2.346	2.314	2.164	2.083	2.017
R2	2.190	2.204	2.175	2.187	2.095	1.961	1.827
R3	2.858	2.664	2.585	2.560	2.413	2.287	2.130
B1S1	2.759	2.569	2.425	2.422	2.468	2.283	2.100
B1S2	2.727	2.571	2.395	2.423	2.460	2.322	2.231
B1S3	2.211	2.227	2.095	2.048	1.925	1.856	1.885
B1S4	1.678	1.670	1.603	1.599	1.429	1.485	1.475
B2S1	2.967	2.787	2.828	2.706	2.631	2.479	2.323
B2S2	3.091	3.048	2.935	2.899	2.908	2.779	2.521
B2S3	2.755	2.686	2.754	2.724	2.272	2.124	1.882
B2S4	1.918	1.870	1.926	2.008	1.700	1.553	1.514
B1R1	2.452	2.318	2.157	2.139	2.087	2.017	1.955
B1R2	1.999	2.031	1.927	1.894	1.923	1.834	1.757
B1R3	2.579	2.429	2.294	2.337	2.202	2.109	2.057
B2R1	2.532	2.519	2.534	2.489	2.242	2.150	2.080
B2R2	2.380	2.377	2.423	2.480	2.267	2.087	1.898
B2R3	3.136	2.899	2.875	2.784	2.624	2.465	2.203
S1R1	3.236	2.945	2.829	2.730	2.741	2.548	2.405
S1R2	2.593	2.497	2.489	2.437	2.456	2.312	2.112
S1R3	2.759	2.592	2.562	2.525	2.451	2.283	2.118
S2R1	2.743	2.753	2.609	2.652	2.580	2.513	2.386
S2R2	2.413	2.435	2.319	2.327	2.411	2.242	2.069
S2R3	3.570	3.241	3.052	3.003	3.062	2.897	2.673
S3R1	2.093	2.160	2.092	2.006	1.726	1.709	1.666
S3R2	2.123	2.218	2.234	2.287	1.981	1.835	1.726
S3R3	3.233	2.992	2.945	2.865	2.588	2.425	2.258
S4R1	1.895	1.816	1.854	1.868	1.611	1.562	1.612
S4R2	1.630	1.665	1.659	1.695	1.531	1.453	1.403
S4R3	1.868	1.830	1.780	1.847	1.551	1.543	1.470

B1=HERTS BRIGADE:B2=GMC BRIGADE:S1=IND THRT SITN
S2=OP ROLE SITN:S3=ROUTNE SITN:S4 SELF COMP SITN
R1=EM AROUSAL:R2=AUTONOMIC:R3=INADEQUACY

TABLE 7.11 (CONTINUED)

	WEEK 1	WEEK 2	WEEK 6	WEEK 12	WEEK 24	WEEK 36	WEEK 52
B1S1R1	3.237	2.867	2.644	2.643	2.783	2.491	2.308
B1S1R2	2.503	2.415	2.313	2.237	2.330	2.182	1.981
B1S1R3	2.537	2.424	2.318	2.387	2.286	2.177	2.009
B1S2R1	2.696	2.587	2.406	2.435	2.384	2.300	2.220
B1S2R2	2.203	2.196	2.051	2.017	2.214	2.065	1.949
B1S2R3	3.280	2.931	2.698	2.818	2.782	2.601	2.523
B1S3R1	1.997	2.072	1.894	1.797	1.686	1.712	1.723
B1S3R2	1.801	1.942	1.836	1.863	1.749	1.683	1.702
B1S3R3	2.834	2.668	2.548	2.485	2.339	2.173	2.229
B1S4R1	1.678	1.748	1.686	1.681	1.494	1.563	1.566
B1S4R2	1.489	1.570	1.510	1.459	1.394	1.408	1.395
B1S4R3	1.667	1.692	1.613	1.659	1.399	1.483	1.465
B2S1R1	3.236	3.024	3.013	2.816	2.699	2.606	2.502
B2S1R2	2.682	2.579	2.666	2.638	2.578	2.443	2.242
B2S1R3	2.982	2.759	2.806	2.664	2.615	2.390	2.227
B2S2R1	2.790	2.920	2.812	2.869	2.775	2.726	2.551
B2S2R2	2.623	2.674	2.587	2.638	2.608	2.419	2.189
B2S2R3	3.859	3.551	3.407	3.189	3.341	3.192	2.823
B2S3R1	2.190	2.249	2.289	2.214	1.767	1.706	1.609
B2S3R2	2.444	2.193	2.632	2.711	2.213	1.987	1.751
B2S3R3	3.632	3.317	3.342	3.246	2.837	2.678	2.287
B2S4R1	1.911	1.883	2.022	2.056	1.727	1.561	1.657
B2S4R2	1.771	1.760	1.809	1.932	1.667	1.497	1.410
B2S4R3	2.070	1.968	1.947	2.036	1.704	1.602	1.474

FIGURE 7.1 SITUATION MEANS BY TIME PERIODS HERTFORDSHIRE FIRE BRIGADE

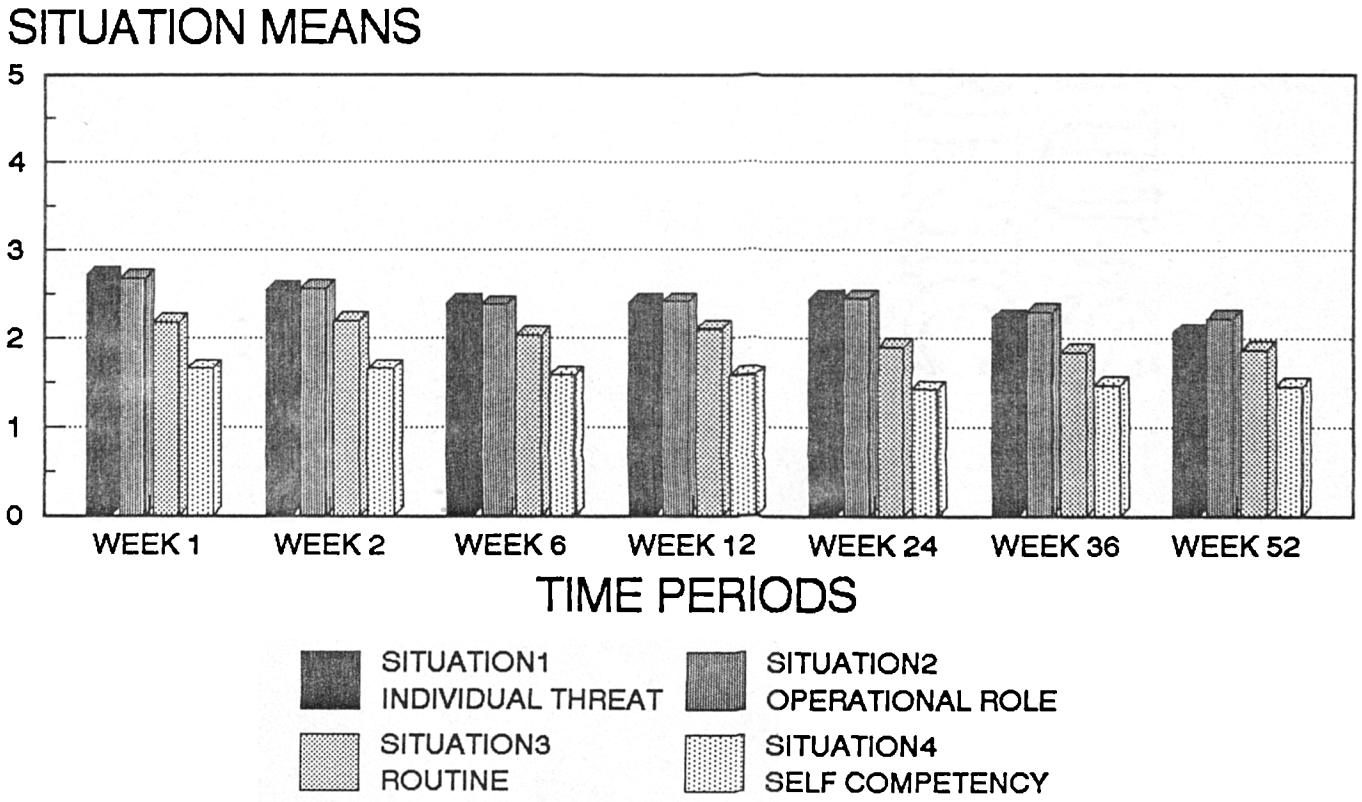


FIGURE 7.2 SITUATION MEANS BY TIME PERIODS GMC FIRE SERVICE

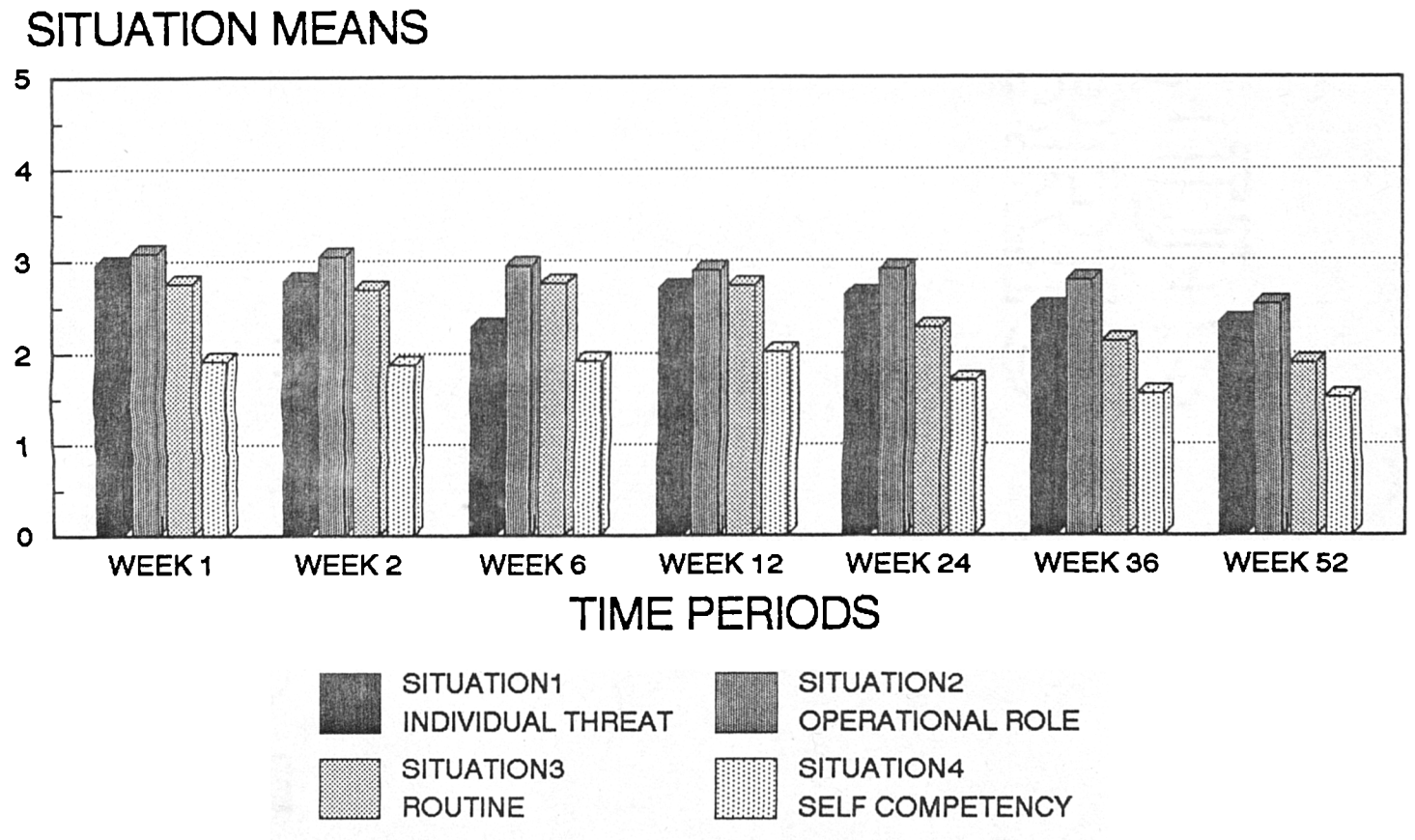


FIGURE 7.3 REACTION MEANS BY SITUATIONS
HERTFORDSHIRE FIRE BRIGADE

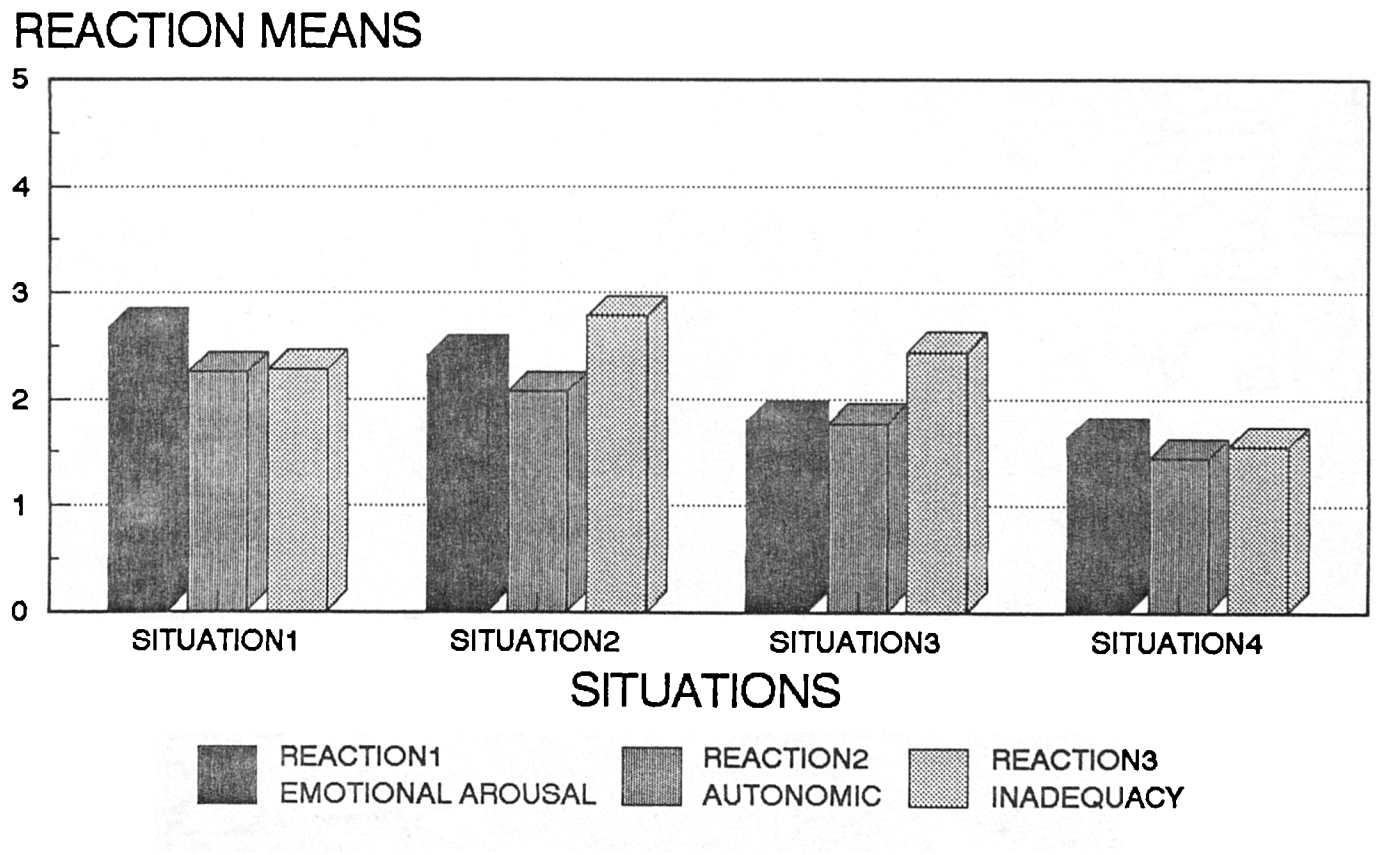


FIGURE 7.4 REACTION MEANS BY SITUATIONS GMC FIRE SERVICE

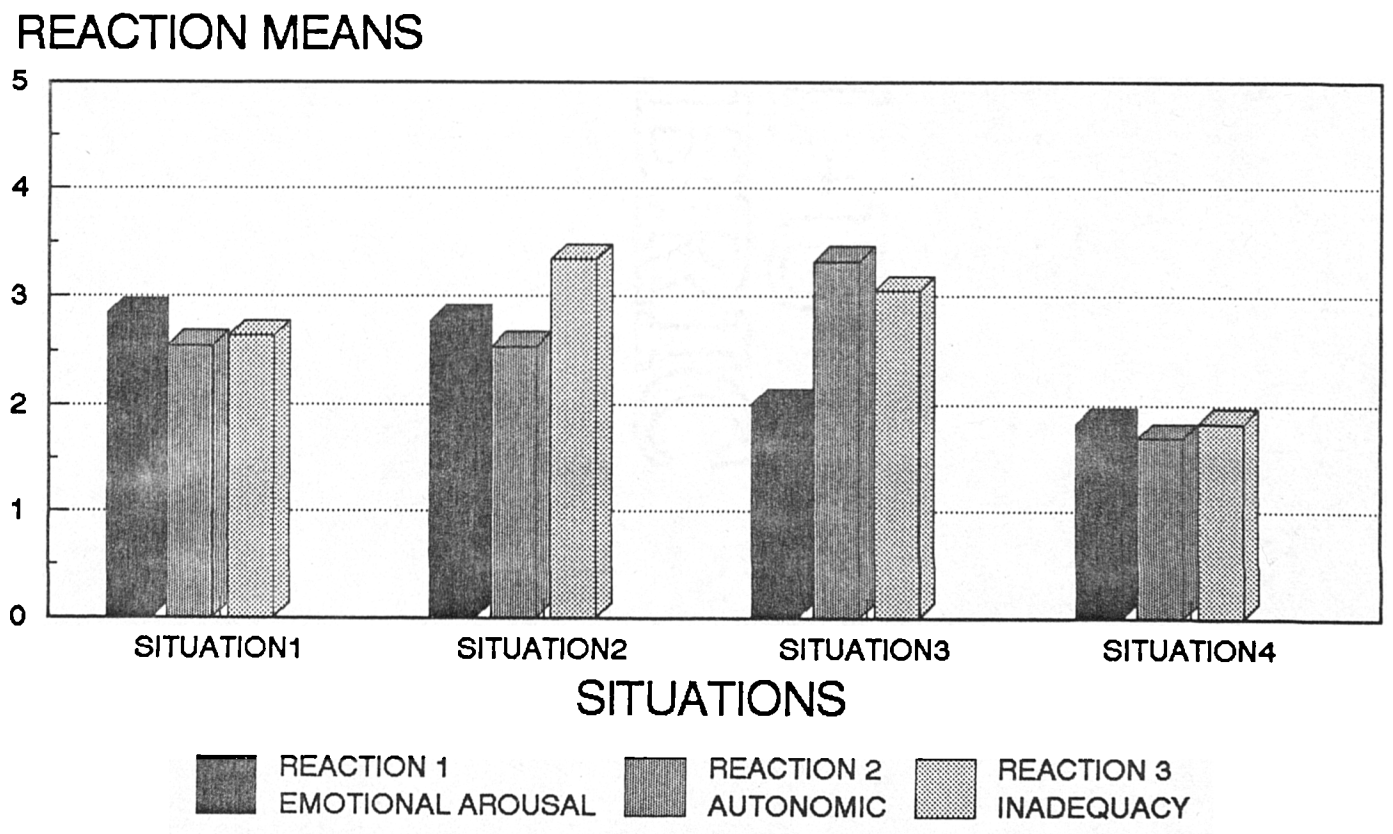


FIGURE 7.5 REACTION MEANS BY TIME PERIODS HERTFORDSHIRE FIRE BRIGADE

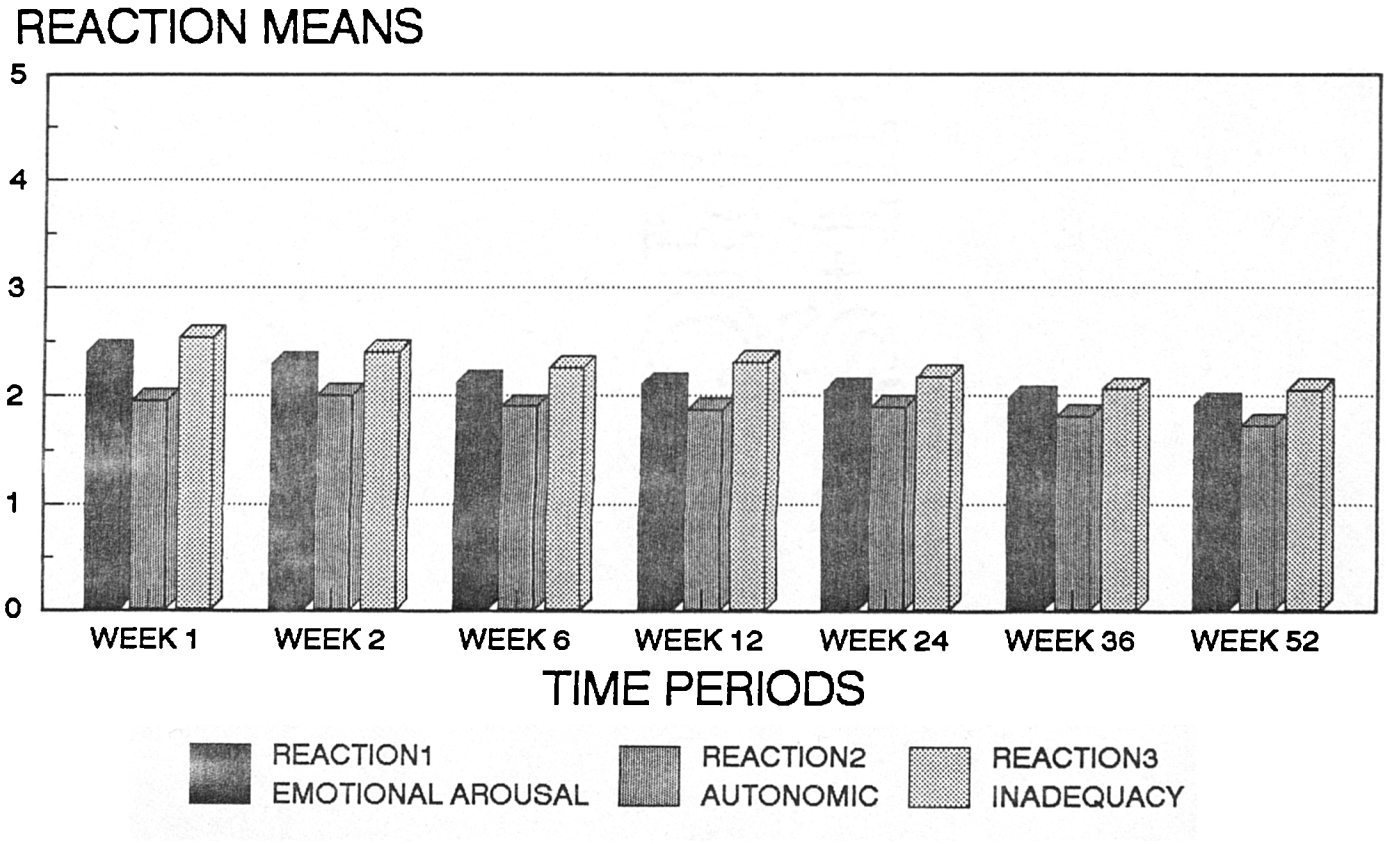


FIGURE 7.6 REACTION MEANS BY TIME PERIODS GMC FIRE SERVICE

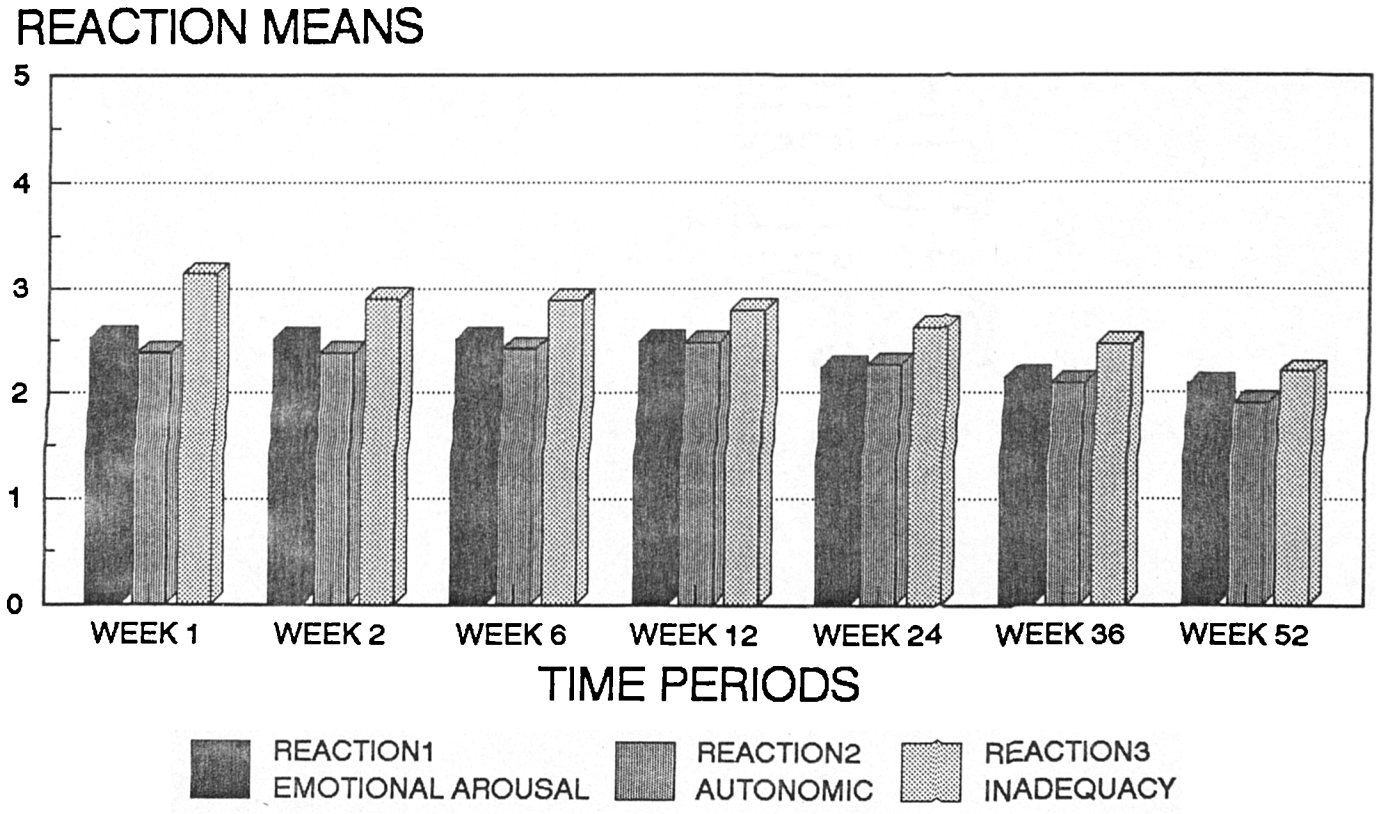
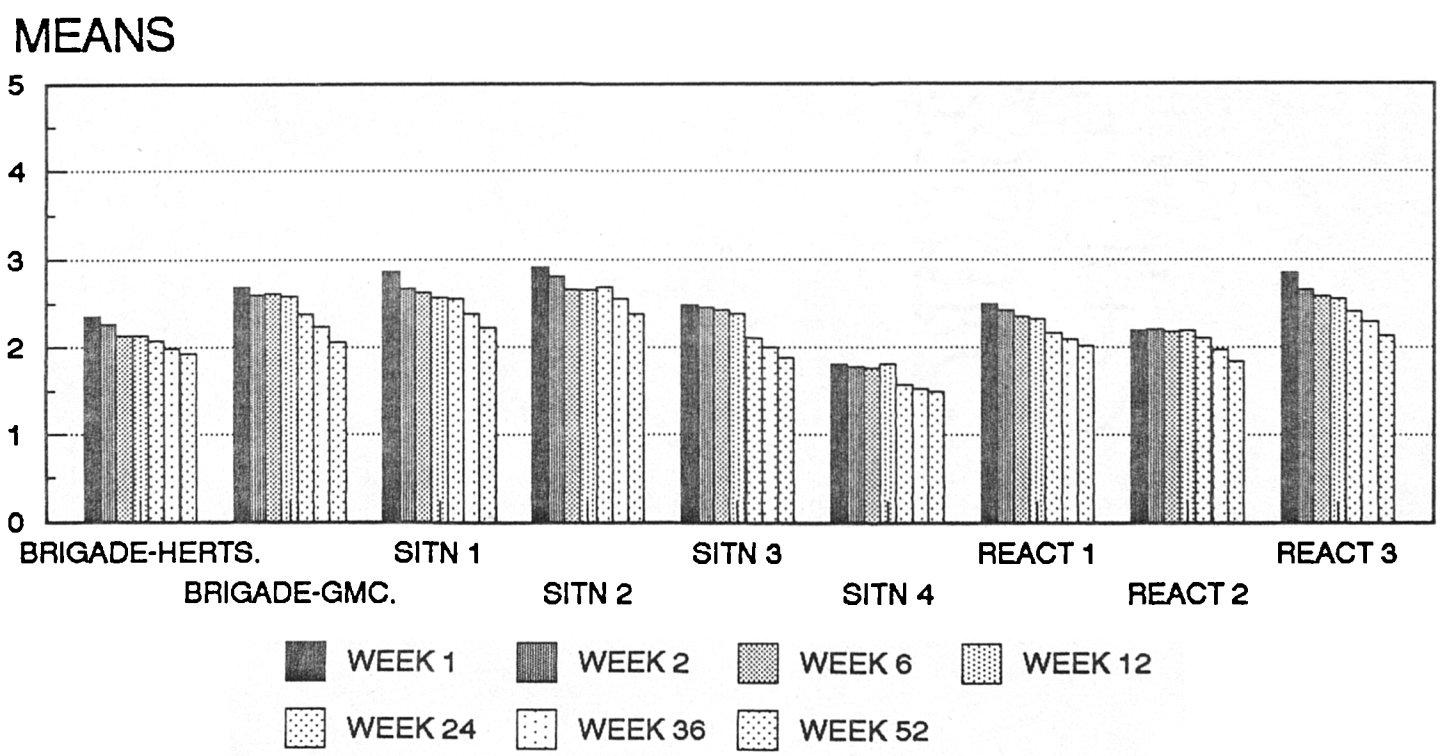


FIGURE 7.7 CHART OF MEANS FOR EACH TIME PERIOD BY BRIGADE, SITUATIONS AND REACTIONS



SITN1=IND THRT. SITN2=OPS ROLE. SITN3=ROUTINE
SITN4=SELF COMP. REACT1=E AROUSAL REACT2=INADQY
REACT3=AUTONOMIC.

during this period were probably due to differences in the training programmes and techniques used in training. Also, S's were reacting to situations on the FSJRQ which they had not had any experience of which would tend to randomise the results. Once S's had been posted to their stations, then the significance levels reduced through week 24 and the differences diminished between brigades to levels below that of significance by week 52. It could be assumed that this was due mainly to S's experiencing all the situations at first hand.

For the within subjects variables main effects, both situations and reactions showed significant differences throughout the time sampling period and all beyond $p<0.001$. The table of means (Table 7.11) shows that the difference for the situations variable is caused mainly by situation 4 (self competency) accounting for a less strong reaction by S's to those situations. Situation 3 (routine) also showed a marked difference in the means where it appeared that S's were reacting less strongly in comparison with situations 1 and 2 and yet more strongly when compared to situation 4.

The reaction means indicated that the difference between all three reactions was marked although for reaction 3 (inadequacy) S's responses were stronger than those for the other two reactions.

The interaction effects of situations x brigade showed no significant differences throughout the time

sampling period other than week 12 where it showed a significant difference at the $p<0.025$ level. The reaction x brigade interaction only reached significance levels at week 1 and week 24 and situations x reactions showed significant differences at all time sample points at $p<0.001$. There were no significant differences found for the situations x reactions x brigades interaction.

In order to explore the data from the initial ANOVA further the percentages of variance were calculated and compared with those collated by Endler & Hunt (1969), Payne et al (1982) and the previous study in Chapter 6. Although the variables used in the present study were slightly different i.e. time period; the total percentages of variance attributable to the main effects and those for the interactions could still be compared. Table 7.12 shows these comparisons. It can be seen from this table that for the main effects there was an equivalance in the sums of the percentages of variance in all the other studies whereas the present study showed far higher percentages of variance for the total of all the main effects for both brigades.

The percentage of variance accounted for by the reactions in the present study was similar to the previous study in Chapter 6 and this was accounted for by the restricted range of reactions used in both studies. The same low percentage of variance accounted for by reactions has been found by both Moos (1969) and Payne et al (1982)

TABLE 7.12 SUMMARY OF THE PERCENTAGE OF VARIANCE FROM 22 STUDIES BY ENDLER & HUNT, PAYNE et als JRQ, PREVIOUS STUDY(FSJRQ) & PRESENT STUDY(FSJRQ)

	ENDLER & HUNT median of var.(%)	ENDLER & HUNT range of variance(%)	PAYNE et al	PREVIOUS STUDY	PRESENT STUDY Herts	PRESENT STUDY GMC
SITUATIONS	4	2-14	10	18.67	23	27.68
RESPONSES/REACTION	25 } 33	15-40	10 } 36	5.5 } 37	4.23	5.83
SUBJECTS	4	1-10	16	12.49	21 } 52	16.17 } 57
PERIODS					3.24	7.49
SITNS X REACTS	8	4-13	10	10 16		
SITNS X SUBJECTS	9 } 27	4-22	15 } 39	17.42 } 35	} 7	} 10
REACTS X SUBJECTS	10	5-16	14	7.48		
BRIG X REACTS X SUBS	—	—	—	—		
RESIDUALS	37	22-50	25	28	41	33

who accounted for this result in the same manner i.e. the restricted range of responses/reactions.

The percentages of variance accounted for by S's in the present study compared more favourably with Payne et al's (1982) results. Both the previous study (Chapter 6) and Endler & Hunt's (1969) collation used occupationally specific groups giving greater homogeneity to the subject sample whereas Payne et al used S's who were from different occupations although they were drawn from the management tiers of those occupations. It could be argued that the present study compares more favourably with Payne et al's, because of the similarity in the percentage of variance accounted for by the subject variable. This is because recruit firefighters are drawn from a wide population of the working environment.

The percentage of variance accounted for by the situation main effects for both brigades in the present study was higher than all the other studies shown in Table 7.12 and well outside the range of the percentage of variance reported by Endler & Hunt (1969). Part of this difference was explained in the previous chapter by the variety of situations presented on the FSJRQ together with their occupational specificity. However, this does not adequately account for the high proportion of variance found in the present study.

When the interactions are viewed, there is clearly no similarity at all between the total percentage of variance

accounted for by the interactions of all the studies and the present study which is far lower. It appears that the first part of outline hypothesis 2 cannot be accepted as the interactionist position seems not to be supported by the data. This is especially so when the percentage of variance accounted for by situations in the present study is considered. It appears that across the longitudinal time frame the strength of S's reactions are situationally driven rather than a product of the interactions.

However, it must be remembered that the interactionist model of anxiety in combination with the study reported in Chapter 6 produced meaningful patterns within the interactions and the interactionist position was therefore supported. The patterning produced was used in the present study to 'collapse' the data to a manageable level. It could therefore be argued that the interactions were being effective and the interactionist position was being maintained amongst the S's but the low percentage of variance being accounted for by the interactions was caused by the imposition of the patterning for reactions and situations on the data. In other words, the patterning may have automatically 'dampened' the percentages of variance attributable to the interaction effects. The counter argument to this is that the 'collapsing' of the data into meaningful patterns should also act on the main effects and therefore they are equally 'dampened' and the differences should therefore

still be present and comparable.

The FSJRQ proved in the previous study to be sensitive to the multi-faceted and multidimensional nature of anxiety at both the group and individual level. The real test of the interactionist model of anxiety is therefore the operation of the model at both these levels. At the individual level an individual can discriminate between groups of situations that differ in the strength of reaction that they elicit. It also assumes that an individual will have an array of reactions which can be grouped together, and be discriminated between by the individual. At the group level, as Payne et al (1982) note in their study, there was a strong consensus amongst individuals about which situations were stressful and which were not. They found a similar consensus existed for the groups of reactions to those situations.

The means in the present study (Figures 7.1, 7.2, 7.3, 7.4, 7.5, and 7.6) seem to contradict this argument in that the lack of interaction effects tends to negate the first part of outline hypothesis 2. They do so by pointing in the direction of the interactionist position. At the individual level it can be seen that individuals are grouping similar situations (in terms of how stressful they are) and reacting to them with definite groupings of reactions. These reactions are variable in strength and dependent upon how stressful the particular group of situations are.

At the group level, there appears to be some form of consensus as to the groupings for reactions and situations. The effect of time periods on these means does not seem to alter to any great extent the 'profiles' of these situations and reaction groupings although the strength of reactions show some attenuation over time.

To further probe the data the percentages of variance were calculated for each time sample point. Table 7.13 shows the collation of this data. Outline hypothesis 1 can be confirmed or otherwise by studying the data in these tables.

The situation main effects accounted for the majority of the percentage of variance across all time sampling points. There appeared to be a steady decrease in this percentage of variance throughout the 12 week training period and peaked at week 24 after 3 months operational service at 32%. This peak was probably due to S's meeting and dealing with a large number of situations for the first time. This gradual reduction shown in training, the increase between week 12 and 24, followed by a reduction again to the lowest percentage of variance of 21.9% at week 52 tended to confirm that S's were changing their strength of reactions to situations as they became more experienced in the use of coping strategies that were learnt, adopted and adapted to meet those situations. The previous study in Chapter 6 showed a percentage of variance for experienced firefighters for situations of

TABLE 7.13 TABLE OF THE COMPARISON OF THE PERCENTAGES OF VARIANCE FOR BRIGADE,SITUATION AND REACTION AT EACH TIME SAMPLE POINT

VARIANCE	WEEK 1	WEEK 2	WEEK 6	WEEK 12	WEEK 24	WEEK 36	WEEK 52
SITUATION	28.9	25.9	23.5	23.0	32.4	26.4	21.9
REACTION	10.9	5.7	5.1	5.0	3.1	3.1	3.0
BRIGADE	4.2	4.6	10.7	11.0	4.0	2.6	0.9
BRIG.X SITN.	0.6	0.7	0.8	1.0	0.5	0.8	0.9
BRIG.X REACT.	1.4	0.5	0.3	0.5	0.5	0.4	0.1
SITN.X REACT.	11.3	6.3	6.7	6.6	6.4	4.7	4.6
BRIG.X SITN.X REAC.	0.1	0.2	0.3	0.2	0.3	0.3	0.1
ERROR TOTALS	44.8	56.6	53.1	52.9	53.0	62.1	68.5

total percentages for each column do not add to 100 exactly due to rounding to first decimal place

18.67%. The reasons for this have been detailed above and explained in comparison with other studies (Endler & Hunt, 1969; Payne et al, 1982) the difference being the use of a greater variety of situations and their occupational specificity. The week 52 percentage of variance for situations of approximately 22% was similar to the figure for experienced firefighters and it could be predicted that the trend for the recruit firefighters to reach the experienced firefighters 18.67% would continue over the next phase of their career.

The reaction main effects accounted for approximately 11% of the percentage of variance at the start during week 1 and steadied from week 2 throughout training at the 5% level. There was then a drop at week 24 to 3.1% steadying to around 3% to the end of the study at week 52. There seemed to be a clear indication that although there was no change in the way that S's were reacting to situations, there was a definite shift occuring throughout the time sampling period in S's strength of reactions to situations. These shifts showed a decline in the reaction scores with a watershed appearing to be reached between weeks 12 and 24. It also seemed from the low percentage of variance accounted for by reactions that S's were reacting to the same situations in the same way. This closeness of fit may be a pointer to homogeneity being established within the occupational group.

The brigade main effects percentage of variance was

low for weeks 1 and 2 and increased markedly to around 11% at weeks 6 and 12. Again, this difference can most probably be accounted for by the differences in each brigades initial recruit training techniques. From weeks 24 to 52 there was a reduction to near insignificance and the differences shown in weeks 24 and 36 were probably due to the imbalance in the gains in operational experience caused by the difference in the two brigades operational workloads. In short, by the time that S's reached the end of the time sample period, there was no perceptible differences between the two groups of S's in their strength of reactions to situations. This is also a pointer to the formation of an overall group homogeneity factor within an occupational setting. The above results for the percentage of variance of the main effects and their concomitant explanations tend to support outline hypothesis 1.

The percentages of variance accounted for by all the interactions were of no real significance apart from the situation x reaction interaction. This was sizeable accounting for 11.5% of the variance at the beginning and reducing to 4.6% at the end of the time sampling period.

These were well within the range of the percentages of variance for this interaction reported by Endler & Hunt (1969).

The analysis of the results of the percentages of variance accounted for by the interaction effects taken

from each time sample point did not on their own fully confirm or support the interactionist position.

7.5.2 Relationships Between Type A behaviour, Locus of Control and the GHQ and Their Effects Over Time

Table 7.14 shows the matrix of intercorrelations between Type A behaviour, Locus of Control and the GHQ. Although 49 S's completed the Type A behaviour and Locus of Control questionnaires and only 36 S's completed the GHQ, the statistical analysis package rejected all cases with missing values. Therefore, only those S's who had completed all questionnaires for both time periods were selected for analysis. For the computations therefore, N=36.

Type A behaviour recorded at week 1 correlated positively and significantly ($p<0.02$) with Type A behaviour at week 52. Locus of Control was similar but the significance level of the correlation was stronger at $p<0.001$. There was no correlation for the GHQ between weeks 1 and 52. The only intercorrelation that reached significance was GHQ week 1 with Type A behaviour at week 1. This was a negative correlation and only just significant at $p<0.05$.

The results of these correlations showed that there was some stability over time with both Type A behaviour and Locus of Control, with Locus of Control being fairly stable. This confirms the notion, (e.g. Cattell & Scheier, 1961; Rapaport, Gill & Schafer, 1945) intuitive

TABLE 7.14 CORRELATION MATRIX(PEARSONS r)FOR TYPE A,LOCUS OF CONTROL & GHQ OVER TIME SAMPLING PERIODS-ALL SUBJECTS(N=36)

	TYPEA(1)	TYPEA(2)	LOCUS(1)	LOCUS(2)	GHQ(1)
TYPEA(2)	0.32**				
LOCUS(1)	0.23	0.04			
LOCUS(2)	0.19	-0.03	0.65*		
GHQ(1)	-0.28***	-0.23	-0.08	0.08	
GHQ(2)	0.14	-0.07	0.15	0.19	0.09

* P=<0.001 ** P=<0.02 *** P=<0.05
(1)= WEEK 1 TIME SAMPLE PERIOD
(2)= WEEK 52 TIME SAMPLE PERIOD

or not, that such traits may be stable over time. The lack of correlation between the GHQ at each time sample point corroborates the view that this type of questionnaire is only valid for the time point that it is being administered and that reported symptomatology is variable over time.

There were slight negative correlations between GHQ and Type A behaviour i.e. GHQ week 1 and Type A week 1 and 52, and GHQ week 52 with Type A week 52. Only one of these correlations reached a level of significance and no definite conclusions could be drawn from this. However, there may be a discernible trend in that individuals who exhibit Type A behaviour may be less prone to disruption through non-psychotic psychiatric disorders when faced with new and potentially stressful situations. It could of course also be that those individuals who exhibit Type A behaviour have little or no time to answer questionnaires correctly! This would be a predictable feature and part of the trait make up of a Type A person. Further correlations were carried out on the data between situation x reaction means and time periods together with the variables Type A behaviour, Locus of Control and the GHQ scores taken at each of the two time sampling points when it was administered. No significant correlations were found for the variables Type A behaviour and Locus of Control but interestingly, GHQ showed varying levels of significant correlations.

Table 7.15 shows a summary of correlations between the situation x reaction means for each time period and week 1 GHQ scores. These results indicated that for reaction 1 (emotional arousal) for all situations over the time sampling period, there were few significant correlations. The most sustained and marked correlations were for situation 3 (Routine). The correlations for reaction 3 (inadequacy) showed a similar pattern for situations 3 and 4 (routine and self competency) and also with situation 1 (individual threat) up to week 12 where it ended its significant effect. Situation 3 continued its significant effect up to week 36. The clearest correlation effects with the longest continuing significance levels was reaction 2 (autonomic) with all situations over all time periods. Figures 7.8, 7.9, 7.10, 7.11, 7.12, 7.13 and 7.14 show the patterning of the correlations of situation x reaction means with GHQ week 1 scores over the time sampling periods.

These results pointed to a relationship that was neither predicted or considered because of the contemporaneous nature of the GHQ. In both self competency and individual threat situations it appeared that the correlations between those individuals who felt most disrupted at the beginning of their career and both autonomic and inadequacy strengths of reaction continued throughout the majority of the time sampling period. For routine and operational role determined situations it

TABLE 7.15 SUMMARY OF CORRELATIONS BETWEEN SITUATION X REACTION MEANS & WEEK 1 GHQ SCORES

SITUATION X REACTION	WEEK 1	WEEK 2	WEEK 6	WEEK 12	WEEK 24	WEEK 36	WEEK 52
COMP X E AROUSAL	.1364 NS	.4045 <.003	.2992 <.037	.2740 NS	.1780 NS	.2161 NS	.4161 <.012
COMP X INADEQUACY	.5286 <.000	.5438 <.000	.5370 <.000	.4070 <.005	.4178 <.004	.4529 <.003	.3058 NS
COMP X AUTONOMIC	.4104 <.003	.5460 <.000	.4884 <.000	.5767 <.000	.3568 NS	.2582 NS	.2150 NS
IND THRT X E AROUSAL	.0911 NS	.2646 NS	.3124 <.029	.2709 NS	.1183 NS	.0266 NS	.1723 NS
IND THRT X INADQY	.5011 <.000	.5696 <.000	.5349 <.000	.6182 <.000	.5767 <.000	.5609 <.000	.1945 NS
IND THRT X AUTONOMIC	.3443 <.04	.4999 <.000	.6619 <.000	.5630 <.000	.4800 <.001	.2895 NS	.1057 NS
OPS ROLE X E AROUSAL	.1158 NS	.3014 <.033	.4185 <.003	.3876 <.007	.3678 <.012	-.0031 NS	.1414 NS
OPS ROLE X INADQY	.5402 <.000	.4831 <.000	.4688 <.001	.5143 <.000	.4491 <.002	.1821 NS	-.0296 NS
OPS ROLE X AUTONOMIC	.3103 <.028	.3787 <.007	.4737 <.001	.4703 <.001	.4076 <.005	.1116 NS	-.1154 NS
ROUTINE X E AROUSAL	.1116 NS	.1468 NS	.2871 <.046	.3720 <.01	.2143 NS	.2494 NS	.3105 NS
ROUTINE X INADQY	.4073 <.003	.4723 <.001	.4464 <.001	.5515 <.000	.5044 <.000	.3499 <.025	.4218 <.01
ROUTINE X AUTONOMIC	.2205 NS	.3236 <.02	.3765 <.008	.3777 <.009	.4582 <.001	.4020 <.009	.2570 NS

(N=49)

FIGURE 7.8 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 1 SITUATION AND REACTION MEANS

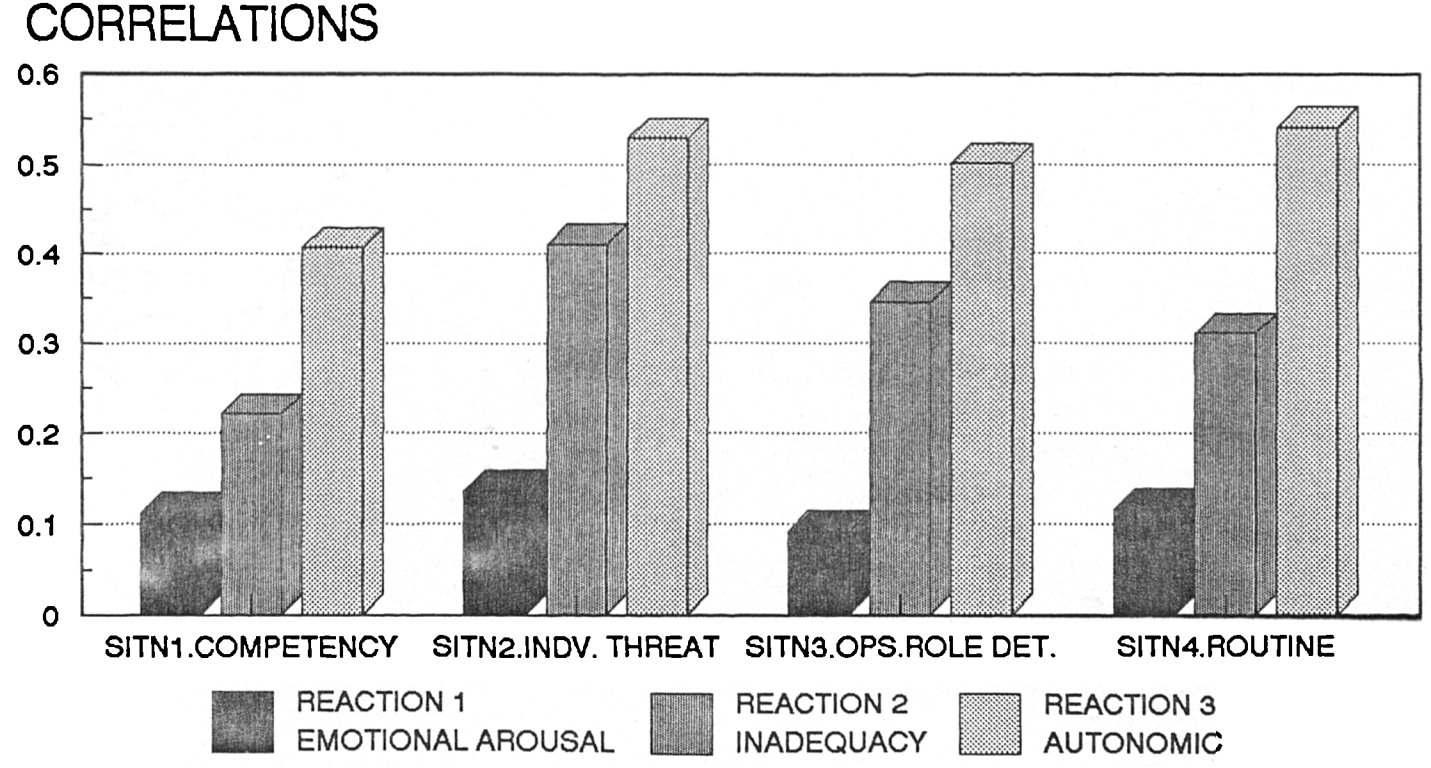


FIGURE 7.9 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 2 SITUATION AND REACTION MEANS

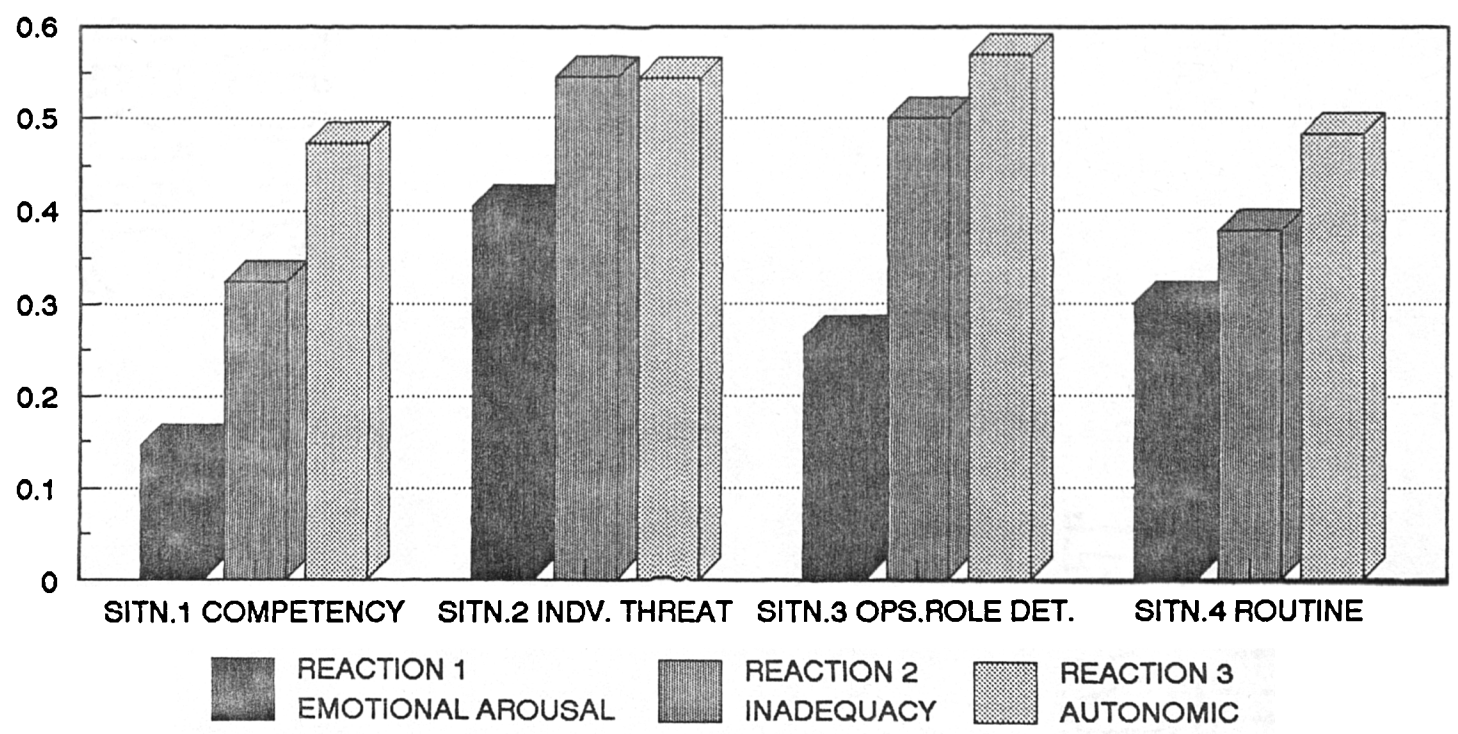


FIGURE 7.10 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 6 SITUATION AND REACTION MEANS

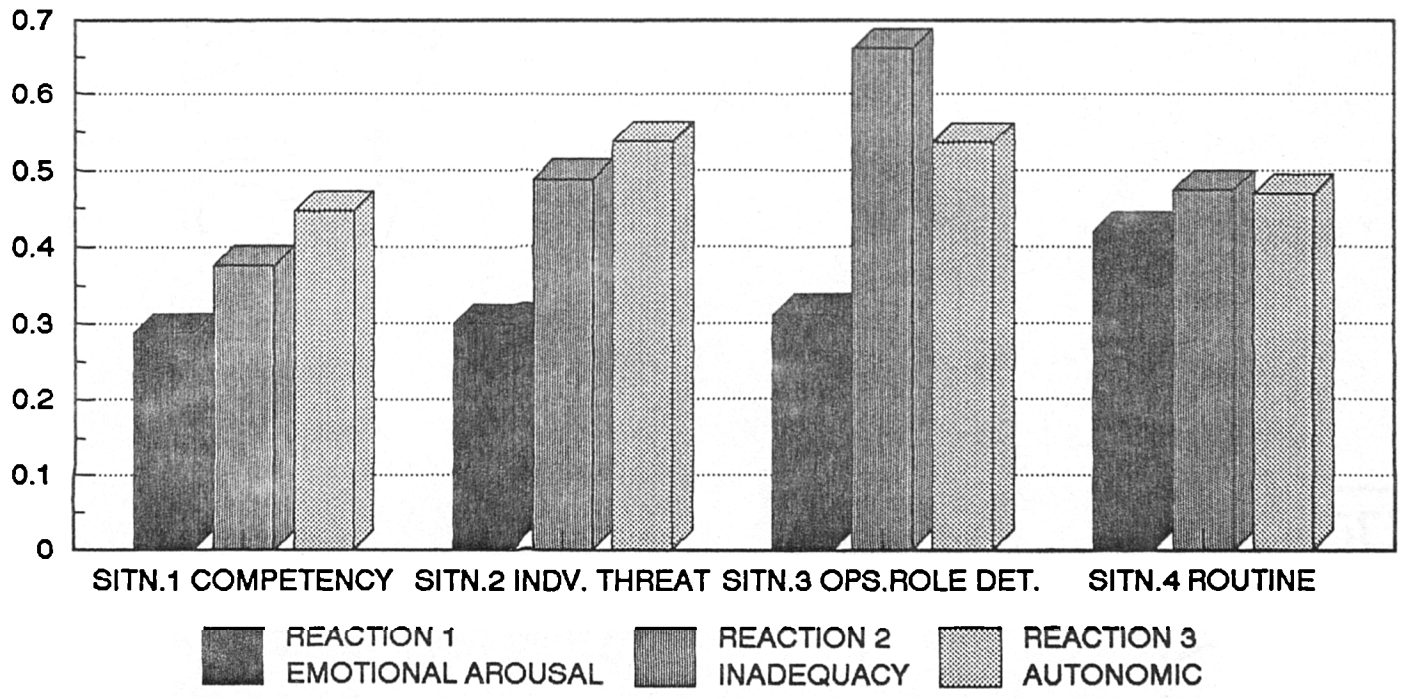


FIGURE 7.11 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 12 SITUATION AND REACTION MEANS

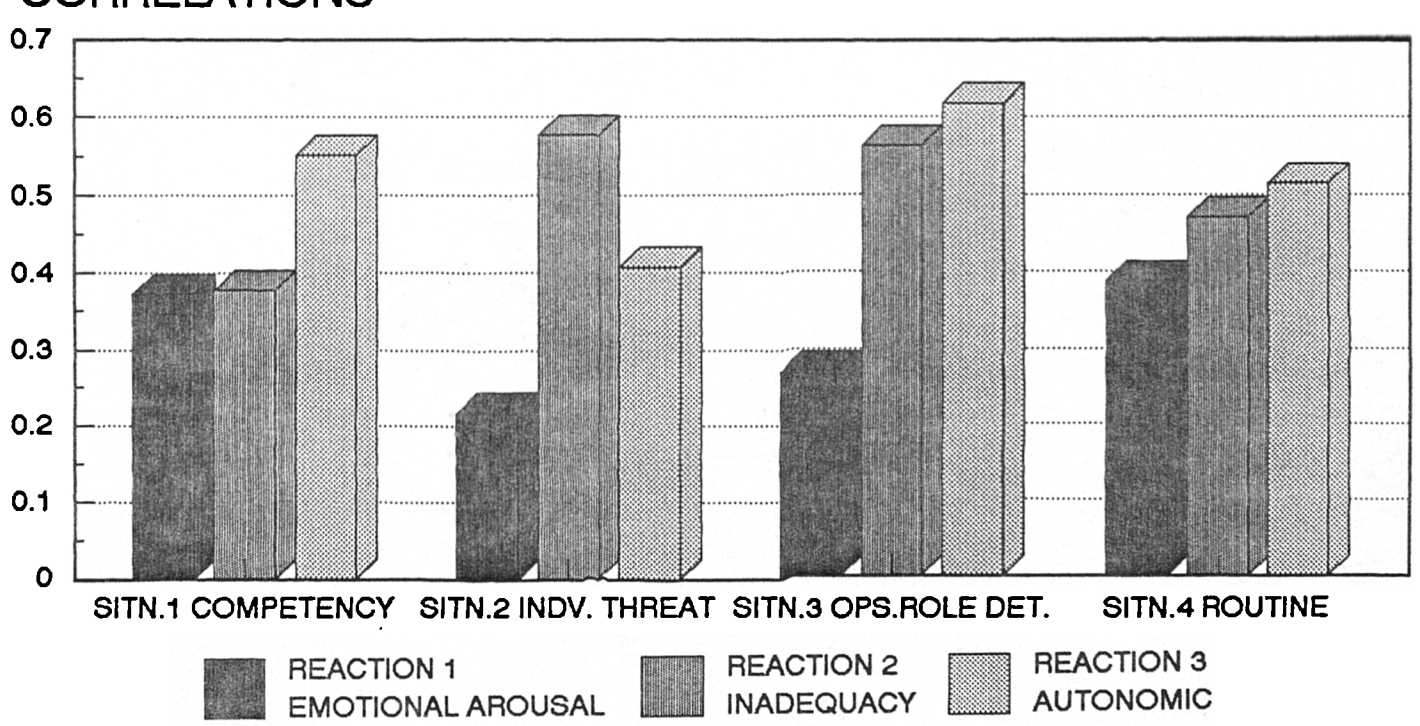


FIGURE 7.12 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 24 SITUATION AND REACTION MEANS

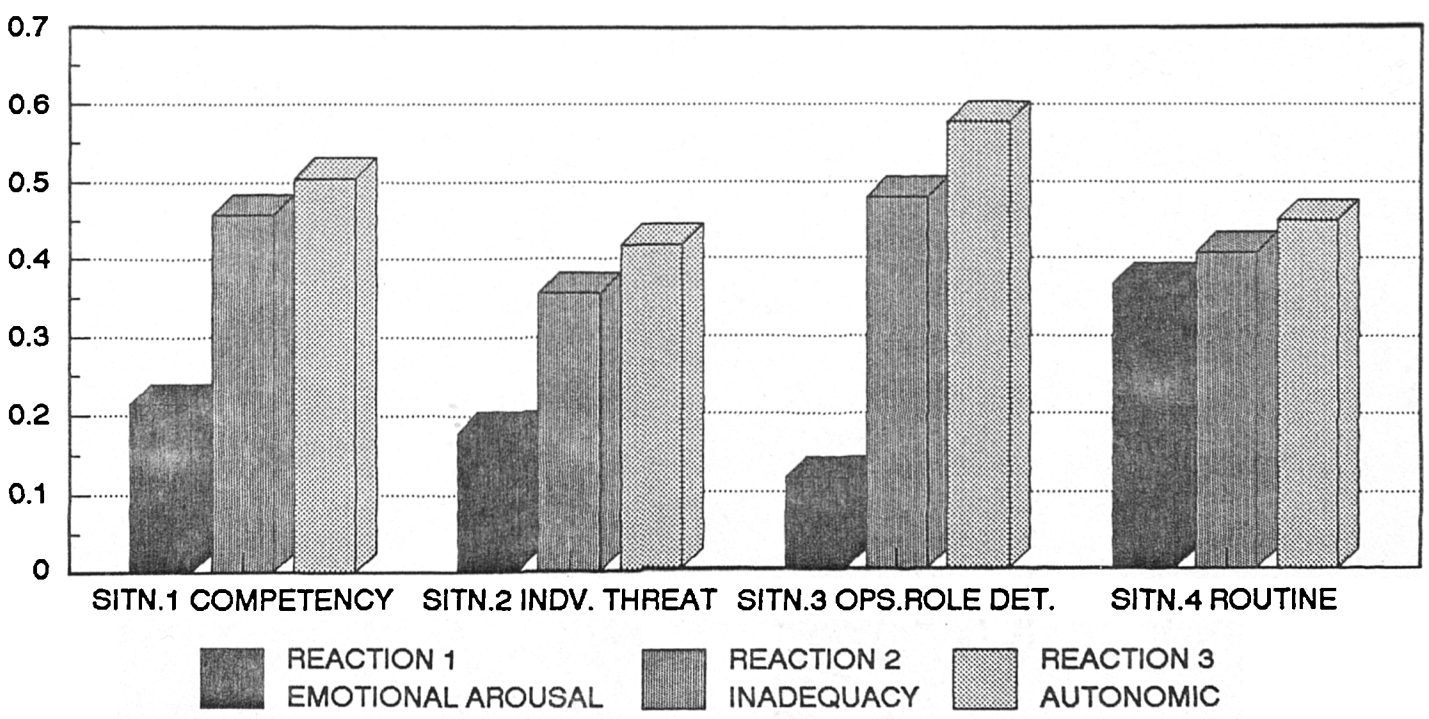


FIGURE 7.13 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 36 SITUATION AND REACTION MEANS

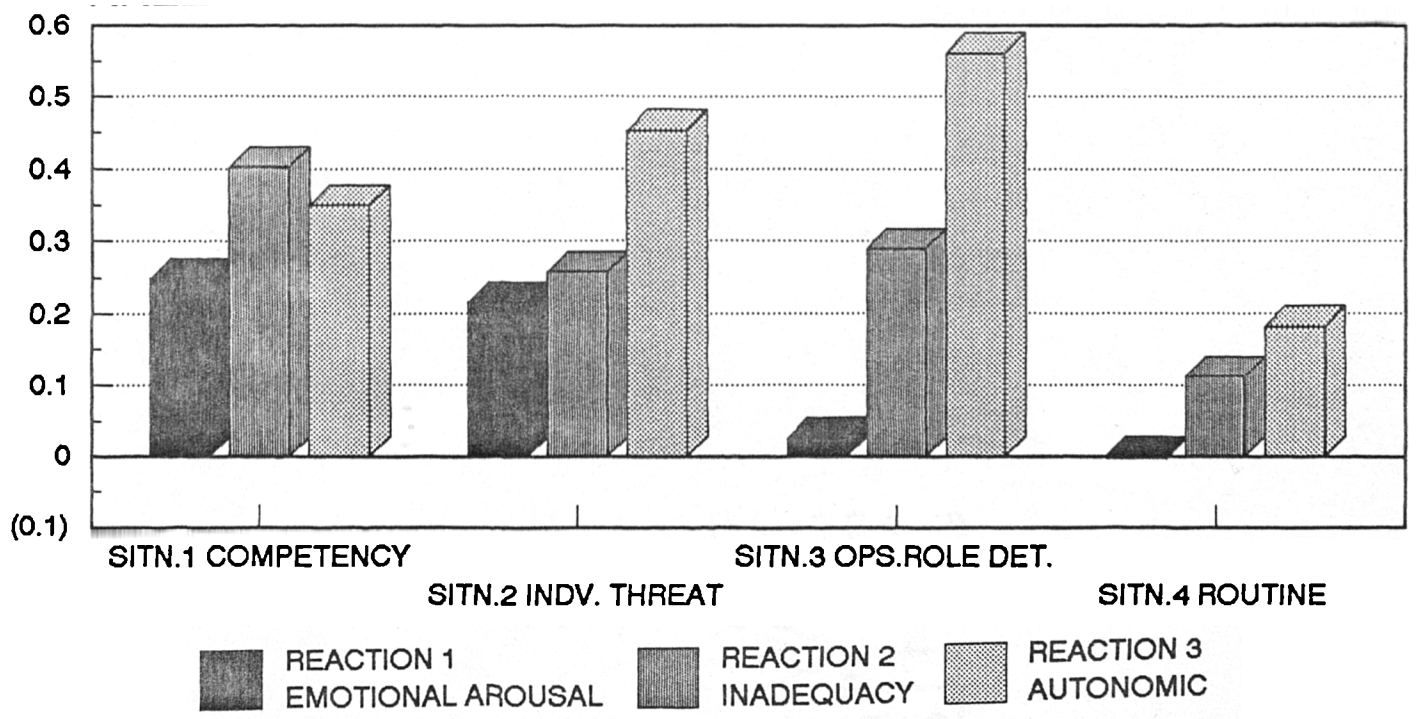
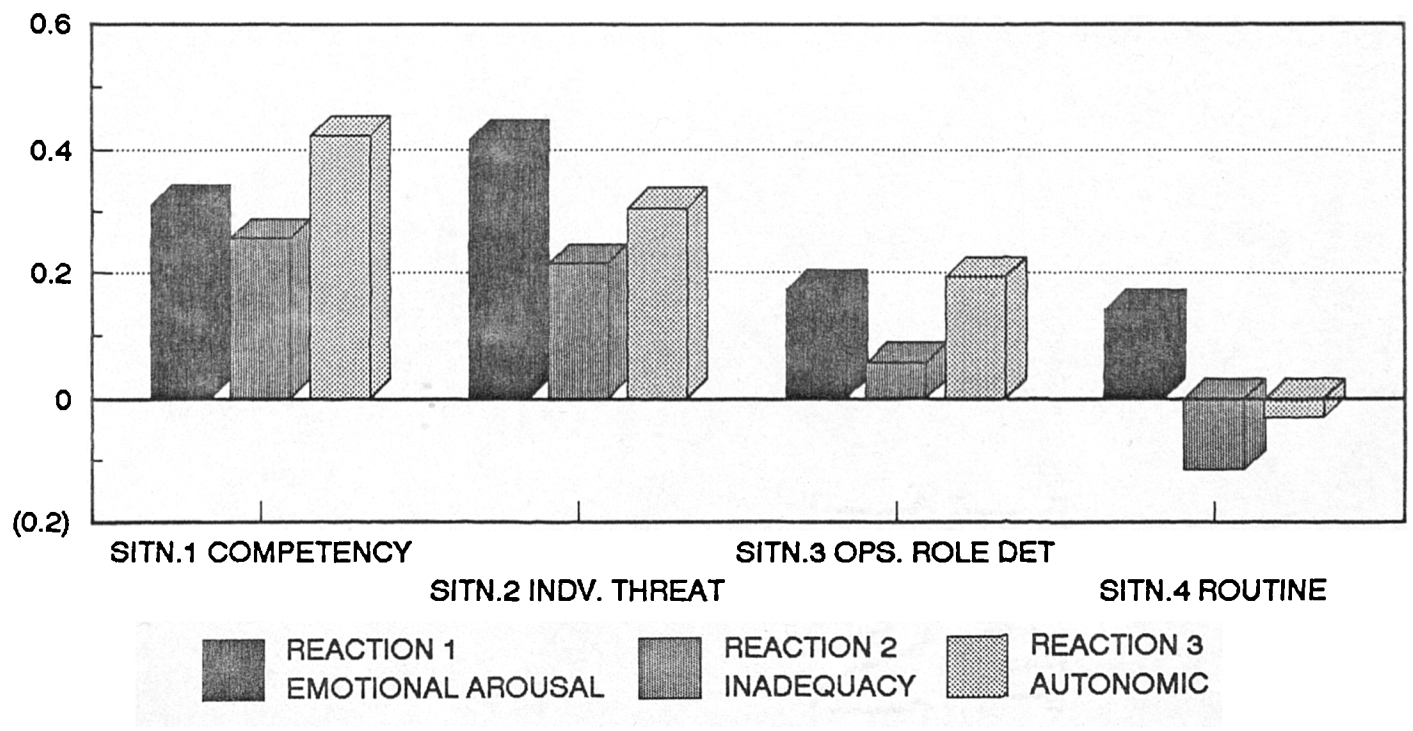


FIGURE 7.14 CHART OF CORRELATIONS OF WEEK 1 GHQ SCORES WITH WEEK 52 SITUATION AND REACTION MEANS



appeared that the training received took over to a greater extent although the autonomic strength of reaction to those situations continued until near the end of the time sampling period.

The week 52 GHQ scores (Table 7.16) did not correlate with situation x reaction means for any of the previous time sampling points except for week 52 itself which started to show a trend towards significant values although the only acceptable level was for operational situations with inadequacy reactions at $p<0.01$.

To pursue the significance of the GHQ week 1 correlations further, another correlational analysis was completed using the division of the GHQ into its 4 primary scales:-

i) somatic symptoms
ii) anxiety and insomnia
iii) social dysfunction
iv) severe depression

S's scores for the GHQ week 1 were categorised according to the 4 scales and then correlated with the situation x reaction means scores for each time sampling period. Table 7.17 summarises the results of the significant correlations at $p<0.001$ and beyond for all S's. Table 7.18 contains the general statistics for the GHQ week 1 data.

The results of these correlations showed that anxiety and insomnia was the most frequently significant factor of

TABLE 7.16 SUMMARY OF CORRELATIONS BETWEEN SITUATION X REACTION MEANS & WEEK 52 GHQ SCORES

SITUATION X REACTION	WEEK 1	WEEK 2	WEEK 6	WEEK 12	WEEK 24	WEEK 36	WEEK 52
COMP X E AROUSAL	-.0677 NS	-.0537 NS	-.0864 NS	.0369 NS	-.0836 NS	.3102 <.03	.3066 <.032
COMP X INADEQUACY	-.1418 NS	.0648 NS	.0317 NS	-.0687 NS	.0347 NS	.2709 NS	.3250 NS
COMP X AUTONOMIC	-.0646 NS	.0918 NS	.0678 NS	.2099 NS	.1692 NS	.3541 <.01	.1676 NS
IND THRT X E AROUSAL	.1975 NS	.2849 NS	.0666 NS	.0357 NS	.0507 NS	.0896 NS	.3155 <.027
IND THRT X E AROUSAL	-.023 NS	.1184 NS	-.0323 NS	-.0584 NS	.1200 NS	.0784 NS	.2295 NS
IND THRT X AUTONOMIC	-.0346 NS	.1134 NS	-.013 NS	.0791 NS	-.0302 NS	.0979 NS	.3824 <.007
OPS ROLE X E AROUSAL	-.0025 NS	.1291 NS	.2104 NS	-.0932 NS	-.1613 NS	.1786 NS	.2798 NS
OPS ROLE X INADQY	.0343 NS	.0381 NS	.1035 NS	.0008 NS	-.1595 NS	.0441 NS	.2539 NS
OPS ROLE X AUTONOMIC	.0167 NS	.0274 NS	.1761 NS	.0446 NS	-.1575 NS	.1010 NS	.2535 <.01
ROUTINE X E AROUSAL	-.3356 <.01	-.1315 NS	-.0215 NS	-.0341 NS	.0283 NS	.2379 NS	-.0641 NS
ROUTINE X INADQY	-.0816 NS	-.0047 NS	.0052 NS	-.0063 NS	.1696 NS	.2418 NS	.0795 NS
ROUTINE X AUTONOMIC	-.1697 NS	-.0954 NS	.0732 NS	.0999 NS	.0918 NS	.2646 NS	.1156 NS

(N=49)

TABLE 7.17 SUMMARY OF CORRELATIONS BETWEEN SITUATIONS X REACTION MEANS AND WEEK 1 GHQ INDIVIDUAL SCALES

	SOMATIC	ANXIETY & INSOMNIA	SOCIAL DYSFUNCTION	SEVERE DEPRESSION
S4R2		0.4437 <0.001		
S1R1		0.4829 <0.0001		0.4747 <0.001
S1R2		0.5017 <0.0001	0.5408 <0.0001	
S3R2		0.4537 <0.0001		
S2R1		0.4492 <0.001		
S2R2		0.5319 <0.0001	0.4939 <0.0001	
S4R2	0.4577 <0.001	0.4711 <0.001		
S1R1	0.5116 <0.0001	0.5239 <0.0001		0.4611 <0.001
S1R2		0.6241 <0.0001	0.4593 <0.001	
S3R2		0.4571 <0.001	0.4579 <0.001	
S2R2	0.4496 <0.001	0.4452 <0.001		0.4854 <0.0001
S3R1		0.4752 <0.001		
S2R1		0.4492 <0.001		
S2R2		0.5139 <0.0001		
S2R1		0.6168 <0.0001		

(N=49)

TABLE 7.18 GENERAL STATISTICS FOR TYPE A LOCUS OF CONTROL AND GHQ (N=49)

	MINIMUM VALUE	MAXIMUM VALUE	RANGE	MEAN	VARIANCE	STANDARD DEVIATION	MEDIAN	QUARTILE DEVIATION
TYPEA 1	141.70	231.08	89.38	189.971	343.365	18.530	191.84	10.90
TYPEA 2	100.18	250.70	150.52	186.140	668.154	25.849	187.48	15.26
LOCUS 1	1.00	17.00	16.00	9.857	12.458	3.530	10.00	2.00
LOCUS 2	1.00	18.00	17.00	9.245	14.939	3.865	9.00	2.50
GHQ 1	0.00	11.00	11.00	2.184	10.361	3.219	0.00	1.50
GHQ 2	0.00	8.00	8.00	0.816	3.236	1.799	0.00	0.50

1= WEEK 1 TIME SAMPLING PERIOD
2= WEEK 52 TIME SAMPLING PERIOD

the GHQ followed by social dysfunction with somatic symptoms and severe depression being the least frequent correlates. In terms of reactions, only emotional reactions did not feature in any of the significant correlations whilst all situations were featured in some way. It appeared that those S's who reported feeling disrupted at week 1 were feeling so mainly through anxiety and insomnia and this seemed to affect both autonomic and inadequacy strengths of reactions to situations which traced through the time periods. For social dysfunction, the correlations only occured with autonomic reactions. There were no prominent patterns amongst the significant correlations that could be discerned or that emerged with the situations, each one being represented in some way but randomly.

After week 12 there was a rapid 'tail off' of the correlations for all symptoms although weaker correlations were recorded for both somatic symptoms and anxiety and insomnia together with autonomic and inadequacy strengths of reaction up to week 36. The pattern of situations still remained random.

The GHQ week 1 raw scores appeared different for each brigade i.e. higher for Greater Manchester, and it was decided that a seperate correlation analysis similar to the one above should be carried out on the Greater Manchester data. Significant levels of $p<0.001$ were only found during week 2 and week 6 and this analysis did not

add anything to the study or the interpretation of the data. It can only be presumed that S's from Greater Manchester over reacted in their response to the GHQ compared with the S's from Hertfordshire.

7.5.3 The Stability of Type A behaviour, Locus of Control and GHQ Scores Over Time

t-Tests were carried out on the data gathered at week 1 and 52 for Type A behaviour, Locus of Control and the GHQ. The data was analysed firstly by each brigade and then secondly, using all of the data. A summary of the results is presented in Table 7.19. There were no significant differences between Type A behaviour and Locus of Control scores between weeks 1 and 52 whilst the GHQ scores for Greater Manchester showed a significant difference at $p<0.001$ level. The GHQ scores for all S's were not significant.

These results supported the prediction that there was stability of personality/behavioural traits over time. More surprisingly, the GHQ scores tended to support the notion of some form of continuity and stability over time of reported well being and symptomatology. This result may not be unequivocal but together with the results of the correlations there appears to be some form of 'carry over' or 'trace' effect which could be attributable to the GHQ scores.

7.5.4 The Concept of Occupational Self-Selection

Table 7.18 outlines the general statistics for Type A

TABLE 7.19 SUMMARY TABLE OF t-TESTS(RELATED) FOR TYPE A, LOCUS OF CONTROL AND GHQ BY BRIGADES SEPERATELY AND COMBINED

	TYPE A BEHAVIOUR	LOCUS OF CONTROL	GHQ
HERTS.(19)	T=0.286 N.S.	T=1.90 N.S.	T=1.689 N.S.
GMC.(30)	T=0.336 N.S.	T=0.064 N.S.	T=5.027 <0.001*
ALL SUBJECTS (N=49)	T=0.434 N.S.	T=1.373 N.S.	T=2.695 N.S.

* TWO TAILED

behaviour, Locus of Control and the GHQ data. Keenan & McBain (1979) determined those who displayed type A behaviour by simply taking those S's who scored above the median. In the present study the medians for the two time sampling periods were 88 and 87 respectively. Using this criteria the total number of S's who displayed Type A behaviour were for week 1, 22 S's and week 52, 23 S's. If the same were done for Locus of Control Externality the results would be week 1, 21 S's and week 52, 23 S's. Table 7.20 shows a comparison of the present study's results for Type A behaviour and Locus of Control with standard scores from Wilkie, Gregson & Looker (1990) and Rotter (1966).

For Type A behaviour, Wilkie et al's results were gained from British male post office workers between the ages of 18 - 65 years, two thirds were manual workers and the remainder were from management. The results of the present study showed a significant difference $p<.001$ between the two occupational population samples and there was a tendency towards Type A behaviour dominance within the recruit firefighters. However, the difference could also have been due to the wider ages of Wilkie et al's (1990) sample as well as the wider spread of jobs of the S's within the occupation. For Locus of Control, Rotter used 84 students and again, given the difference in occupational setting, then the results are close.

TABLE 7.20 COMPARISON OF STANDARD SCORES FOR TYPE A BEHAVIOUR AND LOCUS OF CONTROL

TYPE A BEHAVIOUR

WILKIE et al	DOCHERTY	time period
X = 173.41	X = 189.971	(1)
	X = 186.14	(2)
SD = 33.25	SD = 18.53	(1)
	SD = 25.849	(2)

LOCUS OF CONTROL

ROTTER	DOCHERTY	time period
X = 12.6	X = 9.857	(1)
	X = 9.245	(2)
SD = 4.67	SD = 3.53	(1)
	SD = 3.86	(2)

WILKIE et al.=male post office workers
DOCHERTY=male firefighters
ROTTER=students(1)=week 1, (52)=week 52

A further feature of these results show that there was little differentiation over time which supported the theory of longitudinal trait stability.

It also appeared that there seemed to be no particular bias in recruiting either Type A or internally driven people into the fire service and conversely, the service as an occupation does not specifically attract Type A or internally driven recruits.

7.6 Discussion

Outline hypothesis 1 sought to predict that experience gained by recruit firefighters over time would change their strength of reactions to situations. Experience in the occupational setting included training, experiencing situations, occupational group social interaction, learning of coping strategies and their adoption and adaption. Those changes that did occur should also indicate the establishment of an homogeneity within the occupational group.

The percentage of variance tables showed that although the interaction effects were not significant the main effects showed a predictable patterning. The situation main effect reduced throughout initial training, increasing once S's had started their operational duties and reduced again to around 21% at the end of the time sample period. This figure was similar to the previous study of experienced firefighters of 18.67% for situations.

These results confirmed that S's were changing their strengths of reactions to situations although the reaction strengths themselves were not accounting for a large percentage of the variance. Indeed, these tended to steady during the latter part of the study to around 3%. These results indicated that situations per se were perceived in the same way by all S's throughout the study and they reacted to them in the same way. In other words, there was a taxonomy of situations that emerged amongst S's similar to the findings of the previous study. The situations themselves appeared to be stable within the taxonomic groups. What did change was the S's strength of reactions to those groups. These changes showed an initial reduction in strength of reaction scores and started to attenuate once S's had started operational duties.

Operational role determined situations and individual threat situations attracted the highest strength of reaction scores followed by routine situations and lastly, self competency situations. The profiles of these means close up over time but the pattern or outline stays the same throughout the time sampling period. It is apparent from these results that there was a concensus amongst S's about which situations were more stressful and therefore more anxiety provoking. However, the combination of experiencing situations, the gaining of skills and competency and the learning of coping strategies to deal

with these situations over time reduced the levels of anxiety experienced. This is shown through the reduction of means for the situations and therefore counters Redfield & Stone's (1979) contention and findings that previous experience of a situation does not affect the reaction to that situation. It is also most effectively shown signally in the inadequacy reaction which had the largest reduction in means across all the time sampling points i.e. 0.7.

The findings of the previous study in Chapter 6 showed that the low anxiety situations i.e. situation 3 and 4 contained those situations which formed the coping strategies through anxiety reduction, most notably those that were connected with the 'jigsawing' process. If S's in the present study perceived the same situations as such, then it would be expected that starting to cope would produce low strengths of reactions to those situations. It could therefore be predicted that starting to cope should start to be prominent when S's had gone onto operational duties.

The strength of reactions to these situations were markedly lower than for the other situations throughout the time sampling period proving that S's were perceiving them as low anxiety situations. The marked 'drop off' for situations 3 and 4 was indicated in the means between weeks 12 and 24 whereas the other situations did not reduce at all. However, if these situations are part of a

coping process to reduce overall anxiety then it could be expected that their reduction would in turn reduce the strength of reactions to situations 1 and 2 as time progressed. This seems to be the case.

The argument that the lowering of the strength of individual's reactions to low anxiety situations is part of the anxiety reducing strategy adopted for experiencing high anxiety situations may be tenuous when viewed within the context of the present study but it can be positively linked with the findings of the previous study which highlighted the 'jigsawing' process.

It is interesting to note that throughout the longitudinal study, the means for self competency situations remained the lowest amongst all of the groups of situations. This was not expected because of the lack of knowledge and experience of the S's. It can only be assumed that the recruitment procedure and training given (especially the emphasis on teamwork which is an inherent part of fire service work) helped to build up high levels of confidence which was reflected in S's reactions to self competency situations. From the previous study, the experienced firefighters strengths of reactions to self competency situations were not the lowest, contrary to the findings above. This was most probably due to more reliance by this group on experience per se combined with forgotten technical and theoretical knowledge which would make the experienced group feel more vulnerable in self

competency situations.

The differences that were found between the two brigades throughout parts of the time sampling period could be accounted for firstly, by the differences in the way that each brigade organised its recruit training programme and curriculum and secondly, by differences in operational workload. These differences had disappeared by the end of the study showing that an occupational consensus was being achieved across all S's irrespective of brigade.

The ANOVA's together with the table of means and the percentages of variance supported the notion that the establishment of a concensus amongst the S's was occuring over time. There was more error variance towards the end of the time sampling period meaning that individuals were differing more in their strength of reactions to situations and it could be argued that this would discount the theory of an homogeneity of the group. However, this argument can be countered by the findings of the previous study where homogeneity of the group was analogous to a continuum where at one end individuals reacted to the low anxiety situations with the more common reactions e.g. reactions 1 and 2, giving them more flexibility in their interpretation of how to react to a situation. At the other end of the continuum are the high anxiety situations that elicit the less common reactions, which are highly concensual because of the occupational specificity of the

situation. The continuum concept of homogeneity would therefore explain the error variances that occured. The ANOVA means show that for the high anxiety situations e.g. situation 2 the less common reaction e.g. reaction 3, show higher means than the other situations or reactions throughout the time sample period.

The results together with the discussion above supported outline hypothesis 1 in that there was a reduction in the strength of S's reactions to situations as those situations were experienced. The reduction was due to a combination of training, experience, occupational group social interaction, the learning of coping strategies and their adoption and adaption to meet new and different situations. Payne et al (1987) found that generally, those individuals who had not experienced a situation tended to react to it more strongly and this has been found to be the case in the present study. However, as found in the previous study, there is a point at which a high anxiety situation always remains so to the individual and there is therefore no significant difference in the reduction of anxiety beyond a certain point of experience. Just how far S's in the present study had achieved this point was hard to measure and would probably need a further longitudinal study up to the point of the criteria used for the experienced firefighters study i.e. at least 4 years service.

Outline hypothesis 2 sought to support the

interactionist multidimensional model of anxiety. The result of the ANOVAs showed that the resultant interaction effects were equivocal except for situations x reactions which revealed significant differences at each time sample point. These results were a predictable outcome as both variables had already been grouped into meaningful patterns for the analysis. These patterns had been highlighted from the previous study and had emerged from the interaction variance via the multidimensional scaling analysis. The reactions and situations were therefore a proven source of interaction variance themselves.

The results of the ANOVAs also showed that throughout the time sample period the interactions effects reduced. This should not have been the case if the interactionist position was correct as S's would be expected to displace or offset their individual traits via their gains in experience. The percentages of variance for the main effects should therefore have reduced whilst the percentage of variance for the interaction effects increased. The results of the present study showed that the percentage of variance attributable to both the main and interaction effects decreased over the time sample period whilst interestingly the error variance, which is attributable to individual differences, increased.

On the basis of these results the interactionist position could not be confirmed. It seems that the S's strength of reactions to situations were dependent upon

the situation (or group of situations) per se. The results indicated that the variance due to situations was by far the greatest amongst both the main effects and interactions. This points to individual's reactions to situations being situationally driven.

However, there is a decrement in variances and percentages of variance for all sources of variance over the time sample period both for main effects and interactions. This appears to be due to a reduction in the strength of reactions of S's to all situations as these are gradually experienced and re-experienced and coping occurs. Within this process the individual recognises and perceives situations in an occupational context i.e. they are viewed the same no matter who the individual is or the brigade the individual belongs to.

The multidimensional nature of anxiety can operate at both the group and individual level and forms part of the interactionist model of anxiety as postulated by Endler (1975). The ANOVA results showed that at the individual level, S's were able to recognise and discriminate situations that were similar in terms of how anxiety provoking or reducing they were.

The individual's reactions to any particular situation and the strength of that reaction to that situation must be dependent upon how anxiety provoking or reducing that situation is. It seems that as the occupational identity of the group forms, and experience is being gained, then

there is some form of concensus as to the grouping of the reactions and situations. In other words, the occupational group specificity allows the classification of a situation encountered into a recognised anxiety provoking/reducing situational group and also allows the selection of an appropriate reaction to that situation i.e. a more common or less common reaction. This is the occupational group homogeneising process that produces the taxonomy of situations and reactions. Running parallel to this is the individual whose strength of reaction to any particular situation will be a matter for that individual and dependent upon a variety of factors. Experience, the use of coping strategies and training will, as suggested by the present study, attenuate those strengths of reactions. The range or size of the strength of reaction will be affected not only by experience, coping strategies, training etc. but also by the occupational group specificity. This argument may help to explain the increase in the error variance and the decrease in the main effects and interaction variances due to the interrelationship between the formation of the occupational homogeneity and the maintenance of individuality in the strength of reaction.

The discussion of the results of the ANOVAs and the percentage of variance on their own may not have supported the interactionist position. There seems to be sufficient evidence to suggest that the position may be correct in

some ways due to the multidimensional nature of S's reactions to situations both as individuals and as an occupational group and that the interrelationship between the two is being masked in some way by the main results of the analysis.

The correlations for Type A behaviour and Locus of Control supported the notion that these personality types/ behavioural traits are stable over time. This was further confirmed by the results of the t-Tests which indicated that there were no significant differences in S's scores over time for both Type A behaviour and Locus of Control. These results were expected as the concept of trait stability has been well established in many personality studies. Conley (1985) reported that the findings of a number of studies showed similar trait stability over time and also across situations.

The further correlations carried out for Type A behaviour and Locus of Control with the situation x reaction means for each time period gave no significant results. This meant that the two traits had no direct effect on the way that S's behaved and reacted to situations. The explanation of this result is similar to the definition of trait anxiety proposed by Spielberger (1975) as stable predispostions which vary little from one situation to another and which Watson & Clarke (1984) called 'negative affectivity'. It can therefore be concluded that the personality traits which give stability

and vary so little from one situation to another do not play an important role in an individual's reactions to a particular situation. Otherwise, changes in the strength of reactions to situations would be marked between individuals.

The interactionist position as argued in the previous study and also by others e.g. Redfield & Stone (1979) and Payne et al (1982), has as one of its main tenets that the properties of situations and the nature of anxiety are both multidimensional and specific for individuals. It therefore plays down the role of trait stability though recognising that it may have some effects, whilst it proposes that the interaction of situations with individuals and the reaction outcome is the important feature. Although the interactionist position was positively confirmed by the previous study it is not completely clear whether this is the case in the present study. The discussion of the ANOVAs and their related analyses above has shown that there is some evidence to point to the interactionist position being present. In other words, S's were reacting to situations in a way that was similar to that expected from an interactionist perspective. If the interactionist position cannot be positively found in the present study, and it was found that the personality type measures used were not causing any measurable effect on S's strength of reactions to situations, then why were S's reacting in a similar way to

that which could be predicted from an interactionist perspective?

An explanation of this may be that the training, experience, learning of coping strategies and their adoption and adaption must be the main determinants of S's reactions to situations. The cause of high error variance indicating a large variability in S's reactions may in part be due to lack of experience in dealing with high anxiety situations. This may be one of the causal features in the increase in error variance as S's take up their operational duties and as the variety of situations encountered increases. It could then be predicted that S's would therefore tend to react to a situation 'naively' rather than through a trained or experienced reaction or a well rehearsed or known strategy. The other cause of this individuality of reaction may be through the continuum effect outlined above. However, as identified previously, homogeneity was also having an effect as S's tended to react to the same situations in the same way, the only differences between individuals being in their strength of reaction.

As S's were reacting in a predictable way which was similar to an interactionist perspective, then this could point to an integrated approach whereby not only is it important to know about an individual's characteristic way of reacting to a situation or classes of situation but also how the strength of reactions is affected by being

part of an occupational group. This proposed theory of integration of individuality and occupational group homogeneity combined with the concept of occupational situation specificity extends the model of the interactionist position into an occupational setting.

S's in the present study completed their first 12 months in the service and thus completed one of the most formative parts of their career. Individuals who stay within their chosen occupation are showing self selection according to Payne (1988) who noted that the ones who remain in an occupation tended to be the ones who showed an ability to cope adequately. The data gathered in the present studv on Type A behaviour and Locus of Control offered a window into whether individuals self select certain occupations. Specifically, does the occupation of firefighter attract a certain type of individual? An intuitive guess would be that it does because it is inherently dangerous which may well attract a certain personality/behavioural type. On the results of the present study there may be some evidence for this, but it is still not clear from these and the previous study's results whether the occupation of firefighter facilitates Type A behaviour or attracts Type A people. This is the same for Locus of Control Internals/Externals. These findings are contrary to the suggestions of authors such as Frankenhauser (1976) and McMichael (1978).

Table 7.20 shows the comparison between the present

and other studies and there are some differences apparent, although for Type A behaviour and Internals the present study sample is ½ Standard Deviation higher than the normative sample. However, in order to pursue the notion of the link between personality type and occupational selection further, other measures would need to be used in combination with Type A behaviour and Locus of Control to produce an overall picture of a personality type. In conjunction with this would be the need to study such types over a wide range of occupations.

The correlations between the GHQ scores and the situation and reaction means for each time period, and the further correlations carried out using the four primary scales of the GHQ, showed that there was a connection between the two. Goldberg & Williams (1988) pointed out that the GHQ does not focus on lifelong traits and concentrates on disorders of less than two weeks duration. They also claimed that it does not detect personality disorders and it could therefore be assumed that it is independent of behavioural traits.

The present study found no connection between behavioural traits/personality types (as measured by Locus of Control and Type A behaviour) and S's strength of reaction to situations but there were significant correlations between the GHQ week 1 scores and the situation x reaction means. This finding was counter intuitive as it had been thought that the GHQ was only

effective around the time period that it was administered. It is posssible to conclude from the results that the state of well being at the start or change in occupation may affect an individual's strength of reactions to situations that are encountered within the occupational setting. As time progresses, training and experience become more relevant in balancing out the disruption and upset caused by the career change although as shown in the present study, the disruption may still continue to affect reactions in particular situations.

In the present study the GHQ proved to be a more sensitive measure of those S's who were more anxious across situations than the measures for Type A behaviour or Locus of Control. Although it was not designed as a measure of the stability of an individual's mental health longitudinally, there may be merit in using the GHQ as a predictor of those individuals who may be more prone to feelings of anxiousness across situations. This is especially relevant to the occupation of firefighting as the two primary scales of the GHQ which showed the most correlations were anxiety and insomnia, and social dysfunction. Such disruption is an important feature to be able to predict in firefighting as the previous studies have shown that social functioning within the occupational group, termed 'jigsawing', is an essential and important factor in the reduction of anxiety and forms part of the coping process.

7.7 Summary

The complexity of the data and study design, combined with the relative paucity of longitudinal study design models, meant that 'concrete' hypotheses could not be generated. However, this proved to be an advantage in some ways as the data could be probed and explored in greater detail, with the minimum of constraints and without any imposed directions.

The main aim of the study was to discover what changes if any, would occur over time to S's reactions to occupational situations that were stressful or otherwise as they gained experience of those situations.

The analysis of the results supported the prediction that there was a concensus formed amongst S's as to which situations or groups of situations were anxiety provoking/reducing. There was considerable individual variance in the strength of S's reactions to situations even though there was a detectable group homogeneity forming.

This led to the proposition that the homogeneity of the group was dependent upon a mechanism that was analagous to a continuum, individuals reacted to the low anxiety situations with the more common reactions whilst at the other end, the high anxiety situations elicited the less common reactions which were highly concensual because of the occupational specificity of the situations.

The results also showed that S's did reduce their

strength of reactions to situations over time. It is suggested that this reduction is brought about by the training, experience, occupational grouping, the learning of coping strategies and their adoption and adaption.

It was found that the interactionist position could not be wholly supported by the results of the present study. The strengths of S's reactions to situations and the anxiety experienced was not wholly dependent upon the interaction between individuals and situations or by individuals alone. For S's then, it seemed to be that the level of anxiety shown through the strength of reaction to situations was, in the main, situationally driven.

However, the multidimensional model of anxiety as proposed by Endler (1975) which is part of the interactionist position was found to be appropriate as there was evidence within the data to suggest that the type, number and strength of reactions was influenced by the type, properties and relative provocativeness of the various situations. The results also showed that although the patterning of reactions to situations remained fairly stable, and the strength of reactions reduced in time, there was a point beyond which the strength of reactions to situations would not reduce any further. It appeared that by the end of the time sample period S's were approaching this point as indicated by the attenuation of the situation x reaction means.

It was therefore clear that the multidimensional

model of anxiety was working in the present study but that the individual's reactions were situationally driven rather than a product of the interactions. This was most probably due to S's experiencing a large number of situations for the first time. S's were gradually creating a taxonomy of situations within the group. Occupational specificity determined the classification of a situation encountered into a recognised group of situations. It also determined the selection of a certain reaction to that situation. The strength of reaction would be determined by the individual's perception of the situation and would also be dependent upon experience, training and coping strategies selected.

This integration of occupational group homogeneity and individuality led to the suggestion of an extended model of the interactionist position to understand how an individual starting a career may react to situations and how the strength of reactions to situations might change over time and lead to professional competency and coping.

Another finding of the present study was that Type A behaviour and Locus of Control were stable over time and did not affect the way in which S's reacted to situations. This disproved in some ways the cross-situational consistency theory where personality/behavioural type is the main determinant of an individual's reactions to situations. There was also no evidence to suggest that the occupation of firefighter attracted any particular

personality type from the measures used i.e. Type A behaviour, Internal/External Locus of Control.

Surprisingly, there were significant correlations with week 1 GHQ scores and the situation x reaction means throughout the time sampling periods. It was concluded that although the GHQ is a measure of symptomatology at the time the test is administered, the state of well-being of an individual starting a new occupation may affect the way in which the individual reacts to situations encountered in the occupational setting. The disruption felt by an individual caused by a career change may be reduced or eradicated over time as experience is gained and coping strategies are learnt, but disruption could continue to affect the strength of reactions to particular situations. This disruption appears to be detectable by the use of the GHQ. The GHQ proved to be a sensitive measure of those S's who would report more anxiety across situations and it is suggested that it could therefore be used in a similar manner as a predictor of an individual's performance vis a vis reactions to occupational situations over time.

CHAPTER 8

8 CONCLUDING REMARKS

8.1 Aims of the Thesis

The major aim of this thesis was the study of stress in firefighters as an occupational group. By studying firefighters reactions to situations, and the resultant interactions, it was hoped to try and determine how they achieved coping and eventual mastery of the situations they faced.

The fire service is of interest because it provided an occupation where firefighters faced a wide variety of situations from the mundanely routine to the highly unusual and dangerous. It also provided a subject population that would enable a study not only of experienced subjects but also of recruits entering the career. This allowed for a cross-sectional ('time-slice') study and also a longitudinal approach.

Training in the fire service is seen as a major tool in teaching firefighters to react to any situation by the acquisition of skills and abilities, confidence in equipment, confidence in colleagues and confidence in oneself. Training, combined with experience was also instrumental in the acquisition of coping strategies, their adoption and adaption to the various situations encountered leading to mastery and professional competence.

The specific aims of this thesis were:-

i) to determine those situations that firefighters found to be stressful and anxiety provoking; and conversely those that were stress and anxiety reducing.

ii) the measurement of firefighters reactions to those situations by developing an anxiety measure.

iii) to test the interactionist position as proposed by Endler & Hunt (1969).

iv) to determine how experience (in terms of length of service) affects the reactions and strength of those reactions to situations both in a cross-sectional and longitudinal study.

v) to determine the point at which coping strategies are learnt and mastery is achieved.

8.2 Major Findings of the Thesis

8.2.1 The Preliminary Study

The preliminary study gathered data using a semi-structured interview technique to gather information from a number of firefighters in order to build a frame of reference around those situations which they encountered within their working environment and which they felt were stressful and made them anxious. It also highlighted a number of situations which firefighters felt were anxiety

reducing and which helped them to feel less stressful.

None of the experienced firefighters in the preliminary study felt that they experienced any severe dysfunctional anxiety when attending incidents. This was due to the coping strategies, confidence and competence built up through their experience of situations and the continual training they are engaged in.

Following an incident, firefighters felt fatigued and also elated at a job well done. These types of feelings have also been identified by Ruff & Korchin (1976) in their study of astronauts. It was also found that strong bonds were created between firefighters on the same watch and these interrelationships or socially orientated positive affect (SOPA) were an important factor in helping them to cope. SOPA was especially important immediately following an incident and also on return to the fire station. At these times, personal experiences would be outlined and shared and compared to previous similar incidents and experiences. In this way each firefighter built up a 'flimsy picture' and then a 'rich picture' of the whole of the incident and this activity was termed 'jigsawing'. It was postulated that the process of 'jigsawing' was a necessary part of the coping process and that it facilitated the reduction of anxiety and its displacement throughout the working period to complete the coping process.

The main findings of the preliminary study were that

firstly, the training that firefighters engaged in produced a background to experience which led to automaticity in reactions to emergency situations which in turn led to eventual coping. Secondly, it appeared that coping strategies were built up through experiencing real situations in combination with training. Thirdly, adaptation was the manipulation of the array of coping strategies an individual 'held' and used to 'fit' a particular situation encountered.

8.2.2 Analysis by Mood Categories

The preliminary study gathered data using a semi-structured interview technique. The analysis by mood categories attempted to place the findings of this study into a quantitative format using the concept of mood categories. Mood was chosen as the concept could be used to apply to patterns of general functioning including levels of activation, levels of control, direction of social orientation and negative general appraisal. All these affect the individual in some way, are mediated by the environment and elicit certain responses. Wilkie (1981) extracted 5 factors of mood and those five mood categories were used i.e. happiness, good nature, activation, competence and relaxation. The study concentrated on the times, events and situations where firefighters felt anxious or stressful with particular emphasis being placed on phases of an emergency call.

It was found that relaxation, competence and

activation varied significantly over phases of an emergency call. Fear and anxiety did not reduce with experience and this was counter to the findings of a number of studies of experience, fear and anxiety (Epstein & Fenz, 1962, 1965; Fenz, 1975; Fenz & Epstein, 1962, 1967; Halse et al, 1978). S's anxiety increased in the en-route stage of an incident, gradually reducing upon arrival and at the firefighting phase. It was therefore presumed that this reduction in anxiety was due to the perception of the situation brought about by the firefighters activation and professional competence.

Professional competence was a significant factor in the preliminary study and the mood category analysis showed that feelings of competency increased significantly throughout the early stages of a call, even though S's reported feeling anxious. Feelings of competence reduced once the anxiety provoking stages of a call had been passed. This finding was counter-intuitive as it could be predicted that the initial stages of a call would make firefighters feel less competent until they had mastered the situation. However, the call is what firefighters train and wait for and it must be likely that when they receive one, they engage in the activities that they train for and therefore start to feel competent.

The study also postulated that increases in happiness and good nature would be predictors of anxiety reduction and as a consequence, be part of the 'jigsawing' process.

The results were equivocal although it was noted that these two mood categories may not have been direct or sensitive enough measures of 'jigsawing'.

The main question that these findings provoked was:- how far does experience of a situation or similar situations affect the way in which an individual reacts to it and feels about it?

During this part of the thesis, and before the question posed above was analysed, there was an air disaster which occurred at Manchester International Airport. This provided a unique opportunity to test the methodologies used in the preliminary and mood category studies to study a real-life emergency of disaster proportions.

8.2.3 A Real-Life Disaster Situation

It was decided to place this study within the thesis as it provided a unique opportunity to gain an insight into the stress and anxiety that firefighters might experience when attending such a disaster. It also seemed to fit contextually within the main thrust of the thesis.

Although the subject population was small (14) the findings of the study showed that post disaster stress is a complex interaction between many factors. For the firefighters who attended the incident, the most important interactional factors were individual emotions, professional competence, coping and work group relationships.

There was an immediate impact effect on S's with 78% showing psychological problems such as sleeplessness, anger, inadequacy etc. These problems are common in their manifestation after such events and have been found in similar studies of rescue workers e.g. Duckworth (1986), Taylor & Frazer (1982). There seemed to be little long term impact effects on S's with all reporting that they had not experienced any emotional problems as a direct result of attending the disaster. This was similar to the findings of Duckworth (1986) in his follow up study of police officers who attended the Bradford City Football Club fire. However, some S's still claimed to have 'flashbacks' of the incident 8 months after it had occurred.

Interestingly, the group of firefighters who were used as the control group for the mood category analysis showed no differences with regard to their feelings about the disaster in comparison with the group who had attended. This result was discussed in the light of 'professional empathy' and 'cross-talk' between the groups following the disaster and it was clear that both groups felt anxious, unhappy and less good natured about the disaster.

It was concluded that groups of disaster workers should be recruited and trained together to provide a supplemental force. Such groups would form cohesive bonds similar to those found in firefighters and 'jigsawing'

would become a natural part of these groups activities leading to the process acting as a coping strategy.

It was also interesting to note that the data gathering methodologies used in this study produced similar results to those of Duckworth (1986) and Taylor & Frazer (1982) even though each used different methodologies. They could therefore be included as part of a comprehensive battery of tests and measures to be used when studying post disaster stress or post traumatic stress disorder.

8.2.4 Cross-Sectional (Time-Slice) Study - An Interactional Approach

This study's major concern was to try and determine how far experience of a situation or similar situations affected the way in which an individual reacted to it and felt about it. This is the interactionist position. To gather data for the study, a job reaction questionnaire was devised using as its basis one developed by Payne et al (1982) to measure anxiety at work. This used situations from the previous studies which firefighters had indicated as either stressful or not. The questionnaire was entitled 'The Fire Service Job Reaction Questionnaire' (FSJRQ).

The study drew data from a cross section of a population of experienced firefighters. The data also included Type A behaviour and sickness records. All the data was statistically analysed with the results of the

FSJRQ being subjected to both factor analysis and the complex multidimensional scaling analysis ALSCAL.

The findings of the study showed that although individual differences were apparent in the S's reactions to situations there appeared to be an overall group homogeneity factor at work. This factor manifested itself in the emergence of a taxonomy of situations that all S's seemed to react to in a similar way. This taxonomy produced situations which could be identified and divided into various groups according to how anxiety provoking they were. Tha ALSCAL analysis produced four such situational groups (as did the factor analysis).

Support for the interactionist position was also found through the ALSCAL analysis of reactions which produced three groups of reactions. It also indicated that for the more commonly used reactions, there was a wide spread of patterning suggesting that individuals tended to use their own inherent patterns of reacting until a high anxiety level was experienced when the less common reactions were adopted. In these cases, the reaction patterns were closer together. The interpretation of such close patterns is that the closer the cluster, the less individual differences are present. In other words, the more anxiety provoking the situation, the less individuality in reacting takes place. When this occurs, professional perception (through experience and training) takes precedent and the reactions become more

consensual.

It was postulated that this consensus could be analogous to a continuum. At one end there is sufficient 'looseness of fit' for individual differences to play a part and these reactions are linked to the less anxiety provoking situations within the taxonomy. At the other end, a rigorous and uniform approach is necessary and this is linked to the high anxiety groups of situations.

The dimensions for both situations and reactions that were produced by the ALSCAL analysis indicated that the nature of anxiety was both multidimensional and multi-faceted. This is the main assumption of the interactionist model.

In providing the data and the consequent results, the FSJRQ proved to be sensitive enough to focus on individual strengths of reactions to situations whilst also taking account of group similarities. The ability to operate at both levels meant that the FSJRQ could close the 'gap' between the argument of individual differences (cross-situational consistency) versus situations (situational specificity) and provide a measure of the complexity of the processes without being either state or trait driven.

In this cross-sectional study of experienced firefighters, it was clear that as an occupational group they classified situations into certain groups dependent upon how anxiety provoking they were. There was a consensus in this taxonomy. At the same time, there

appeared to be a complex process where individuals were determining their own reactions to certain groups of situations i.e. state driven. It was also apparent that their behaviour and reactions to occupational situations which were anxiety provoking and therefore potentially stressful, were more likely to be a product of their experience and the training they received in order to react to those situations with uniformity. This, it could be argued is trait driven. However, the overall results suggested that the interactionist position was correct.

The main questions posed at the end of this study were:-

i) how far does prior experience of a situation affect an individuals reactions to it?

ii) does experience affect the strength of reactions to situations?

iii) if ii) does occur, when will the 'fall off' point occur i.e. when are coping strategies fully learnt?

8.2.5 A Longitudinal Approach

The main aim of this study was to attempt to tackle the questions posed by the cross-sectional study. A longitudinal approach was used to study a number of firefighters as they entered the occupation as recruits and followed them over their first year of service. The study gathered data using the FSJRQ developed in the

cross-sectional study in order to :-

i) gain insights into how S's reactions to situations changed over time.

ii) predict the achievement of homogeneity amongst firefighters as an occupational group within the time frame of the longitudinal study.

iii) determine in the light of the previous study whether the interactionist position was supported or otherwise.

The longitudinal approach also provided an opportunity to gather data on individual characteristics i.e. Type A behaviour and Locus of Control. It was predicted that the gathering of this data longitudinally and within an occupationally specific group would provide answers to the following questions:-

i) does the occupation of firefighter attract a specific behavioural type?

ii) are personality characteristics stable over time?

Finally, the GHQ was administered to explore relationships and interrelationships between the personality characteristic measures as well as the results from the FSJRQ.

The major findings of the longitudinal study supported the prediction that there was a consensus formed among S's about which situations were anxiety

provoking/reducing. Although the group homogeneity that was forming was detectable there was still considerable variance in S's strength of reactions to situations. A similar pattern was found in the cross-sectional study which used the continuum analogy to explain the mechanisms involved. This explanation was also valid for the findings in the longitudinal study. It was also found that S's reduced the strength of their reactions to situations over time and it was proposed that this was brought about by training, experience, occupational grouping, the learning of coping strategies and their adoption and adaption.

The interactionist position was not fully supported by the results of the analyses on the data which suggested that the levels of anxiety shown through the strength of S's reactions to situations was, in the main, situationally driven. However, this is a feature of A-State effect which is part of the interactionist model. Evidence for the interactionist position was also found in the results by the appropriateness of 'fit' of the multidimensional models of anxiety to the type, number and strengths of reactions which were influenced by the various situations. There was no evidence to suggest a general anxiety trait as postulated by Lazzerini et al (1979) either in this study or the cross-sectional study. It was concluded that the larger than normal residuals were due to S's experiencing a large number of situations

for the first time.

It was clear that S's were gradually creating a taxonomy of situations together with the formation of group homogeneity which was occupationaly specific. These factors were determining :-

i) S's classification of a situation within the taxonomy.

ii) S's selection of a certain reaction to that situation.

The strength of reaction to any situation is determined by the individuals perception of the situation based upon experience, training and the coping strategies selected.

It is suggested that by integrating the concept of the formation of group homogeneity with individuality in determining the strength of reactions, an extended model of the interactionist position can be proposed. This extended model would help in understanding how firefighters at the start of their career react to situations and also how those reactions change over time as situations are encountered and experience is built up leading to professional competency and coping.

A further finding of the longitudinal study was the stability of Type A behaviour and Locus of Control over the time sampling period. These two traits did not affect the way in which S's reacted to situations. This result tended to disprove the cross-situational consistency of A-

Trait theory. There was some evidence in the results to show that the occupation of firefighter may attract Type A people.

One of the most surprising findings of the study was the significant correlations between week 1 GHQ scores and the situation x reaction means throughout the time sample period. It is suggested that although the GHQ is a measure of recent symptomatology, it is sensitive enough to those individuals who feel disrupted about their career change and it could therefore be used as a predictor of an individual's performance in an occupational setting.

8.3 Implications for Psychological Theory

8.3.1 Theories of Situations, Reactions and Interactions

One of the main questions asked by this thesis was one posed by Endler (1973) of how persons and situations interacted to determine behaviour. The findings have focussed on the role of situations in an occupational setting being a major determinant of behaviour. For firefighters, situations can be both stressful or non-stressful, anxiety provoking or anxiety reducing.

In occupational settings, it is more likely that certain sets of situations are encounterd. These situations are therefore imposed on the individual. For firefighters, the studies in Chapter 6 and 7 used those sets of situations, drawn from their own experience, recall and feelings, which were identified in the early chapters as both stressful and non-stressful. A number of

researchers (e.g. Ekehammer, 1974; Endler & Magnusson, 1976a, 1976b; Magnusson, 1978; Pervin, 1978) have distinguished between the subjective and objective aspects of situations. Magnusson (1978) made the conceptual distinction between the objective 'external world' that affects the person and the subjective 'inner world' as the person perceives it and reacts to it. This theorising implies that different individuals may classify similar situations differently and also react to them differently.

The results in Chapters 6 and 7 show that this is not the case for firefighters who, through their training, gradual build up of experience and the use of the experience of others, classify situations into certain groups dependent upon the reactions that the situations provoke. This process is similar to the suggestion of both Frederikson (1972) and Rotter (1954) that situations could be classified according to the similarity of responses they provoke. This thesis supports this notion of the formation of a taxonomy of situations that are unique to an occupation. The taxonomy is defined by S's and uses situations that are from a naturalistic setting. It is recognised that all situations are multifaceted and multidimensional and that various contextual and motivational factors may affect the relationship between perception and reaction. However, the present findings do not support Endler's (1980) notion that two persons may perceive the identical situation but react to it in

entirely different ways, and also react to it differently on different occasions.

The formation of a taxonomy of situations determined by the reactions they provoked in firefighters supports the theory that there is a group consensus about which situations are stressful or otherwise. The interaction effects are important here as they produced the patterning of the clusters of both situations and reactions. The patterns of clusters are independent of individual differences and are similar to those found by Payne et al (1982). This confirms further the theory of a taxonomy of situations as well as indicating the type and strength of reaction that they elicit.

The similarity of the strength of reactions that the taxonomies elicited from individual firefighters in the cross-sectional study pointed to a group homogeneity. This homogeneity may be specific to firefighters but it is suggested that it may also be a feature of other similar occupational groups. The results of the longitudinal study showed clearly the formation of this homogeneising effect over time. It is clear that training and experiencing situations is an important factor in the process of 'homogeneising' the individual into producing the right reaction (that is similar to other individuals reactions) for a particular situation encountered. This, it could be argued, is the measure of change from individual behaviour to group behaviour. In other words,

there is an emergence of behavioural consistency within the group. The only varying factor within this group consistency theory is the strength of an individual's reaction to a situation.

This theory of group consistency that determines the source of occupational group behavioural variance makes the cross-sectional consistency theory and the situation specificity theory irrelevant to studies of stress and anxiety in occupational settings and also, maybe, in other groups. This is because, as outlined above, implicit in the group consistency behavioural model is the formation of taxonomies of situations and homogeneity of the group in terms of their reactions to situations. The mechanisms responsible for this are the interactions between individuals, situations and reactions. This lends further support to the interactionist position.

The only differences found within the group of firefighters were the individual strength of reactions to situations. It appears from the findings of both the cross-sectional and longitudinal studies that S's were not reacting to situations by displacing their fear and anxiety as experience was gained as suggested by Fenz & Epstein (1967). There was clear evidence to suggest that firefighters always produce a phasic response to stressful situations. Training and experience reduced the size of the phasic response and this result was also found by Halse et al (1978) in their study of army parachutists.

This effect may be generalised to other occupations where either training and/or experience can be used to predict the onset of this form of experiential habituation to stressful situations or events.

The interactionist position is relevant to experienced firefighters. However, there is a phase at the beginning of a firefighter's career, before group consistency is achieved, where behavioural reactions to situations are driven by the situations themselves. The findings of this thesis point to the gradual learning, adoption and adaption of strategies and coping behaviour. Together with the gaining of professional competence, these factors become part of the interactional approach. One of the major features of this thesis is the proposal of an extended model of Endler & Hunt's (1969) interactionist position. This model can be likened to a continuum and takes account of individual differences and integrates them within the theory of group consistency.

8.3.2 The Interactionist Theory of Anxiety

Endler (1975) stated that the concept of anxiety was of great theoretical importance. Anxiety as defined in Chapter 1 is the behavioural response to a stressful situation. Spielberger's (1972) distinction between State and Trait anxiety referred to emotional reactions and individual differences in anxiety proneness respectively. A series of studies (Endler et al, 1962; Endler & Okada, 1975; Endler & Shedletsky, 1973) showed that trait anxiety

was multidimensional in nature and the interaction effects were important in determining how individuals reacted to certain situations. Situations and events are themselves multidimensional. The interactionist position was therefore important, and was extended to study work anxiety by Payne et al (1982).

In the case of firefighters, it appears from the findings that the multidimensionality of anxiety is correct and that a response is determined by the individual in interaction with the situation. However, the assumptions of the interactionist model can be extended by this thesis findings to include the interaction at an occupational group level. A further feature of the interactionist model of anxiety when applied to an occupational setting is the clear relationships that Payne et al (1982) found between situations and reactions. They found that high stress situations elicited the autonomic reactions whilst arousal and wish-to-avoid reactions were characteristic of low stress (routine) situations. They also found that these patterns existed independently of individual differences which provided evidence for the existence of situations that were stressful to everyone in their study and also of a scale of severity of modes of reaction to stress. The same findings are found in the present thesis. These findings, together with Payne et al's (1982) strengthen the proposed theory of group homogeneity and taxonomy of

situations which are classified by the anxiety they provoke or reduce as perceived by the group.

The theory proposed here in terms of firefighters is that when joining the service and during initial recruit training, they bring both individual Trait and State anxiety characteristics with them into the service. They are therefore an heterogeneous group. The initial training that they undergo, their continuation training and their gradual build up of experience has an homogeneising effect and they begin to perceive and deal with the situations they encounter at work as a group. Neither Trait or State anxiety therefore exists in their specific occupational setting and there is clear evidence to propose a model of occupational group anxiety. It is suggested here that in the light of the present and Payne et al's (1982) findings that such a model exists and can be extended to other occupations as it is important in understanding not only how an individual reacts to a situation and also how these factors interact, but also how an occupational group reacts to situations it encounters whilst at work. It is also important to be able to measure these effects and the format of the FSJRQ has proved to be a valid means of doing this.

8.3.3 Theories of Coping and the Mastery of Anxiety

Coping is the mastery of a situation by an individual who responds successfully to environmental factors. Cohen & Lazarus (1979) see these responses or efforts as both

action orientated and intra-pyschic. Coping can be anticipatory or a reaction to past or present situations (Cohen, 1987). Coping is the process which acts to reduce anxiety experienced by an individual.

Epstein (1967) proposed a theory of the mastery of anxiety in which the exposure to a threat developed a broadening, steepening and heightening gradient of anxiety. With experience, there is a development of an inhibition gradient. Anxiety gradually provides an increasingly early warning system to reduce levels of arousal when faced with a source of stress. The present findings show that for less experienced firefighters, there is a phasic response, although a stressful situation always continues to elicit an anxiety response. This is similar to the findings of Halse et al (1978) in their study of army trainee parachutists and is counter to the theory postulated by Epstein (1967).

The implication for theories of mastery of anxiety and coping is clear in that a person will always produce a contemporaneous reaction to a stressful situation. The size, selection and type of reaction will be dependent upon the amount of experience that a person has of dealing with the stressful situation as well as the skills and abilities that have been learnt as part of the repertoire of coping strategies built up through training.

Training and experience allow anxiety that is experienced to be kept to minimum levels so that coping is

achieved. Successful coping therefore leads to mastery, and in occupational settings, professional competence. As in the findings of Ruff & Korchin (1967) in their study of Mercury Astronauts, firefighters seemed more pre-occupied with operational details. Anxiety seemed to be more related to success of the 'job' and the team rather than with the fear of failure. Again, this is attributed to experience and training to react to situations as a group, the effectiveness of adaptive responses being based on the taxonomy of situations and group homogeneity which facilitates eventual mastery and professional competence.

Training per se provides the basis for adequate coping. It allows the aquisition of abilities and skills which make the individual, and in the case of firefighters, the group, respond to a situation without feeling overchallenged or uncomfortable. The array of reactions to situations can be thought of as strategies for coping which are built up through training. A number of researchers (e.g. Haggard, 1949; Mechanic, 1970; Motowildo et al, 1986) have noted that training and adequacy of preparation, both cognitive and physical, is necessary to develop adequate skills and regularised adaptive responses to reduce anxiety and its aftereffects.

The initial training that firefighters undergo, together with their continuation training throughout their career has been shown in this thesis to be fundamental in developing competent skills and abilities to meet the

challenges of the job. Those skills and abilities are enacted without any great awareness and this was reported by S's in the initial studies and was termed 'automaticity'. The findings in this thesis confirm the assumptions of previous studies and theories that training is an inherent part of the process of coping and mastery of anxiety.

Coping may also occur by other means. One of the major theories of coping takes account of the use of others for support (Cohen, 1978). This can be a retrospective process. Firefighters in the present series of studies placed great emphasis on group cohesion, group activity and teamwork which they felt helped them to cope. The process of socially orientated positive affect that firefighters engaged in after incidents that they had attended was a major factor in the reduction of anxiety and formed a significant part of the coping process. This important feature was termed 'jigsawing' as it allowed firefighters to gain a 'flimsy' then 'rich' picture of the incident and fit it into a context. The concept of social support can therefore be extended into specific occupational settings where jigsawing can become a part of a new concept of group social support.

It is apparent that this type of group or professional support may be critical in determining whether the group as a whole, or individuals within the group, cope adequately with stressful situations that they

encounter in a work environment.

8.3.4 Type A Behaviour and Locus of Control

The findings in Chapter 6 showed that Type A behaviour did not correlate with age or experience and was therefore a 'fixed' characteristic. There was also no correlations between Type A behaviour and strength of reactions to situations and this was similar to the findings of Keenan & McBain (1979) who found no correlations between Type A behaviour and role overload in an occupational setting. Type A behaviour is characterised by sustained drives, competitiveness, desire for advancement and achievement, haste and impatience, and these behaviours are prompted by environmental factors (Friedman & Rosenman, 1974). Chapter 7 used measures of both Type A behaviour and Locus of Control and the results were similar to Chapter 6 therefore supporting and confirming that both characteristics are 'fixed' whilst not being situationally or environmentally driven. This finding counters the notion that these behaviours are prompted by situational or environmental influences.

Type A behaviour and locus of Control Internals are characteristics which have been presumed to be predictors of people who overreact, but in the present series of studies, there was no evidence of this. It is apparent from the results of this thesis that although Type A behaviour and Locus of Control may be fixed traits which are consistent across situations, they do not

significantly affect behaviour in stressful situations. These findings support the theory of situational specificity rather than cross-situational consistency. However, there was consistency of reactions to situations shown by firefighters and it is postulated here that training, competency and experience interact to produce this consistency, regardless of personality or behavioural type. It may also be postulated that training, competence and experience modify or suppress individual behavioural characteristics sufficiently to produce 'standard' reaction patterns to specific situations. When this happens, occupational group behavioural characteristics take over. Further proof of this 'overriding' of an individual's personality or behavioural type is explained by the theory of group homogeneity discussed previously.

The results of Chapter 7 showed that for the subject sample, there was around ½ Standard Deviation difference in comparison to the normative samples used for Type A behaviour and Locus of Control. These results tend to support the notion that the occupation of firefighter may attract Type A and/or Internals and facilitate these behaviour patterns. However, stronger and more unequivocal results are needed in order to pursue the notions of self-selection and occupational attraction by personality or behavioural type. To achieve this, it would be necessary to research a full recruitment sample to an occupation and continue the research longitudinally.

8.3.5 Use of The GHQ as a Predictor

The General Health Questionnaire was developed by Goldberg (1972) as a measure of recent symptomatology. Goldberg & Williams (1988) have stated that the purpose of the GHQ is to concentrate on disorders of less than two weeks duration and that it does not focus on lifelong traits. Also, it is not presumed to detect personality disorders and is therefore independent of behavioural traits and characteristics. This was found to be correct from the results in Chapter 7 which showed no correlations between GHQ and Type A behaviour and Locus of Control.

The findings of Chapter 7 showed that there were significant correlations between GHQ week 1 scores and situation x reaction means which continued over time. This indicated that although the GHQ is only effective for the period immediately leading up to being administered, there was a 'trace' effect showing that certain kinds of predispositions which individuals have are lasting. The implications of this finding is that the GHQ can be considered to be a more subtle and sensitive measure of the state of well-being of individuals over time than was first thought. It can therefore be used as a predictor of predispositions that may signal future disruption or dysfunction to the individual in his or her career as well as a general predictor of coping behaviour by indicating those who will tend to feel more anxious across situations and who are therefore less likely to cope and achieve

mastery and professional competence.

8.4 Suggestions For Future Research

The study of stress and anxiety in occupational settings has come to the fore in recent years. This awareness has led most research to centre on dysfunction as an outcome and therefore its inevitability has been an implicit assumption within the research literature. It is suggested here that the time has come for future research to concentrate on being predictive and proactive. Such an approach will help in the recognition of causal factors which in turn should lead to diagnostic and pre-emptive action before dysfunction occurs.

Payne et al's (1982) JRQ and the FSJRQ used in this thesis have shown that a sensitive and contextual measure of stress and anxiety at work can be developed to predict work behaviour and reactions to situations. Although situationally based, the FSJRQ is neither trait or state driven giving it a 'neutral bias'. The contextual basis of the measure makes it meaningful and relevant to respondents, especially with the inclusion of non-stressful/non-anxiety provoking situations.

The FSJRQ is a valid measure for use with either cross-sectional or longitudinally designed studies. A similar measure could be developed for use in any occupation using situations which are occupationally specific. This is important as the patterns of individual differences vary by occupation (Holland, 1976).

A new research perspective using longitudinally designed studies is needed with measures similar to the FSJRQ. These studies should start at the outset of an individual's career and should continue over a carefully chosen time span in order to 'capture' experience gained. The time span chosen is one of the problems with longitudinal studies but it should be sufficient to allow for the completion of skills and the acquisition of competence within any particular job. The time span may therefore be 'tailored' to the occupation it is designed to study.

The data gathered in this way should be used to produce an occupational group 'profile' for each time sample. Comparisons can then be made between individuals and the group profiles. In this way the measure can be used as an early predictor of impending or underlying dysfunction as well as a predictor of developing skills, abilities, coping, competency etc. This point may be of greater validity in the future with the emergence of new measures of achievement which are competency based i.e. National Vocational Qualifications (NVQ's).

There is a need to relate the results of a job reaction questionnaire to other variables such as job satisfaction, rank or position, sickness and ill-health, role anbiguity etc. If this is carried out, more will be learnt about the interaction of these factors with individual and group characteristics.

There is also a need to carry out further longitudinal research on those individuals who cannot cope and leave their employment. It is just as important to find out how and why those individuals did not cope and the JRQ's that they complete before they leave may provide clues to non-coping. If profiles of non-copers can be made from the results then they may act as indicators of possible non-coping behaviour for future recruits to an organisation.

The results of JRQ's may also be used as predictors of the effectiveness of training by comparing individual reactions to situations before and after training. When used in such a way, different methods of training can be compared for their effectiveness in teaching individuals to deal with situations.

Finally, the GHQ used in its present form was found to be a valid measure of the disruption felt by firefighters during the beginning of their career. It is felt that the GHQ needs to be more sensitive by being more definitive within the categories it uses. This would give more breadth to the questions that could be included within it. It could then be used as a more comprehensive measure of an individual's feelings and therefore used as a predictor of future performance in an occupational setting.

8.5 Final Remarks

This thesis has hopefully extended the exploration

into stress and anxiety at work and provided an insight into the direction of future research within the topic.

It is necessary to continue a multi-methodological approach to probe the structures of situations, reactions and characteristics of individuals in order to fully understand the complex processes involved in the interaction of these factors.

Only when this is achieved will we be able to contribute fully to a true interactional paradigm on the understanding of stress and anxiety in occupational settings.

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APPENDIX 1

Semi Structured Interview Questionnaire

Section 1 - Personal Details

1. Name
2. Brigade
3. Age
4. Educational Qualifications
5. Length of Service in Fire Brigade
6. Length of Service at Present Station
7. Approximate number of calls per year at Present Station

Section 2 - Training

8. What aspects of training do you think are most useful in helping you to cope with stress on the fireground.
9. Do you find that simulated conditions in training put you under stress.
10. Do you experience anxiety before, during or after an incident.
11. Do your colleagues seem to experience anxiety before, during or after an incident.

Section 3 - Fires

12. Which of these items do you feel is most stressful:-
    The bells 'going down'
    Going to a fire
    Arrival
    Working at a fire
    Making up
    Returning to station
    Driving
13. What are your feelings when you are enroute to a fire
14. What circumstances at a fire do you feel put you under stress
15. How do you cope with that stress

16. Are there any specific types of fires that you feel put you and/or your colleagues under stress

17. How do you think your colleagues cope with stress they experience at a fire

18. How do you feel after a fire with regards to stress and anxiety

19. Do you talk about jobs you have been to - if so when

20. Do you ever think about how you and your colleagues coped with the stress of attending a fire

Section 4 - Special Services

21. Do you think that special services where life is in danger present you and your colleagues with differing amounts of stress compared with a fire. Is the difference greater or smaller for special services

22. How do you think you cope with the stress of attending a special service call involving life

23. How do you think your colleagues cope with such situations

Section 5 - General

24. Do you ever think of the dangers involved in your job and at what times do you think of them

25. Do you think your colleagues think of the dangers involved in the job

26. How do you and your colleagues cope with the thought of possible dangers to 1) yourself, 2) your colleagues, 3) the public

27. Does training help you to cope with stress and anxiety encountered at incidents

28. When you or your colleagues have encountered danger or a situation which has produced fear/stress/anxiety what do you do about it, i.e. forget it, talk about it etc.

29. When faced with going into a job, do you consciously employ a personal strategy to try and take your mind off the possible dangers or hazards you may come across. What is your greatest fear

30. Do you ever notice a change or changes in the behaviour/attitude of your colleagues when attending an incident in comparison to their behaviour back at station (aggressiveness)

31. Do you ever notice a change in your behaviour/ attitude when you are at a job

32. On return to station after a job, do you feel more aggressive than you did before the incident and do you find your colleagues show more aggression in the same situation

33. Do you think that fear subsides with experience

34. Ask 'S' about gradient of fear and time curve and its displacement. Where do you think we displace our fear

35. When fear is experienced, when do you think it subsides

36. What leisure activities do you enjoy most

37. How do you 'let off steam' on the station

38. Are there any other situations at work where you feel that you experience fear/stress/anxiety - how do you cope

39. Do you look forward to going to fires and special services - what is it that makes you look forward to them i.e. challenge, danger seeking etc.

40. Do you ever feel like not coming to work

41. Do you feel irritable when you go home after nights etc.

APPENDIX 2

Mood Scale

NAME.....

1. Please rate the way you feel in terms of the dimensions given below.
2. Regard the line as representing the full range of each dimension.
3. Rate your feelings as they are at the moment.
4. Mark clearly and perpendicularly across each line.
5. Work quickly through each dimension.

tense	_____	relaxed
sleepy	_____	awake
competent	_____	incompetent
happy	_____	sad
good natured	_____	bad tempered
elated	_____	depressed
proficient	_____	muddled
active	_____	lethargic
nervous	_____	calm
alert	_____	drowsy
intelligent	_____	stupid
euphoric	_____	discouraged
cheerful	_____	irritated
at ease	_____	anxious
annoyed	_____	friendly

TOUR : DAYS/NIGHTS/OFF DUTY (Delete as appropriate)
DATE :
TIME : Hours

Complete below for all calls attended.

En Route/Arrival - At the Incident
Immediately after Incident
On Return to Station
(Tick appropriate heading)

Time of Call: .....

Nature of Call: .....

APPENDIX 3

Programmed Regime

Times that subjects were asked to fill in a response form during their hours of duty.

Group 1

1st Day	2nd Day	1st Night	2nd Night
0930	0800	1830	1700
1100	1300	2200	2000
1500	1600	0800	2300
Home after 1800	1700	Home after 0900	Home after 0900
	Home after 1800		

Group 2

1st Day	2nd Day	1st Night	2nd Night
0800	0930	1700	1830
1300	1100	2000	2200
1600	1500	2300	0800
1700	Home after 1800	Home after 0900	Home after 0900
Home after 1800			

N.B. Day shift hours of duty 0900 - 1800 hrs

Night shift hours of duty 1800 - 0900 hrs

APPENDIX 4

Normal Station Routine

Days

0900	Parade
0900 - 0930	Vehicle and equipment checks
0930 - 1100	Training (Drill)
1100 - 1115	Tea Break
1115 - 1300	Training/Station Duties
1300 - 1400	Lunch
1400 - 1530	Station Duties/Equipment Maintenance/ Training Exercises/Hydrant Inspections/ Fire Prevention Inspections.
1530 - 1545	Tea break
1545 - 1730	Station Duties/Equipment Maintenance/ Training Exercises/Hydrant Inspections/ Fire Prevention Inspections.
1730 - 1800	Personal equipment maintenance - stand down.

Nights

1800	Parade
1800 - 1830	Vehicle & equipment checks
1830 - 2030	Training & Station Duties
2030 - 2100	Supper
2100 - 2330	Station Duties
2330 - 0700	Stand Down
0700 - 0815	Station Duties
0815 - 0845	Breakfast

APPENDIX 5

POST DISASTER - QUESTIONNAIRE - MANCHESTER AIR DISASTER

Please answer all the questions below. A space has been left below each question for you to add further comments or amplify your answer if you feel that it would be useful.

Please delete where appropriate.

1) Age .....

2) Did the incident have a significant effect on you?
If so, in what way did it affect you:- .....

.....

.....

.....

3) Did you feel stessed by the handling of the bodies on aircraft? YES/NO
If YES can you describe in what way you felt stressed

.....

.....

.....

4) At what time did your feel most stressed:-
During the incident/immediately after/sometime after/ still feel stressed
Amplify here:-.....

.....

.....

5) Have you noticed any changes in yourself since the crash? YES?NO
If YES, please state:-.....

.....

.....

.....

6) Did you feel that you coped with the stress of handling the bodies? YES/NO

.....

.....

.....

7) When you were handling the bodies, did you employ any type of strategy to help you cope, i.e. imagining the bodies were other than humans, i.e. waxwork dummies, etc. YES/NO
If so , please describe the strategy or images you used and if you found them useful:-.....

.....

.....

.....

8) Have you used similar types of images or strategies in the past? YES/NO
If YES please give details .....

.....

.....

.....

9) Do you still use this kind of strategy? Never/sometimes/always

10) Have you talked over the experience of the air disaster with other people. YES/NO
If YES, please state with whom, i.e. friends, family, colleagues, etc. and how often you talked about it:-

.....

.....

.....

11) Have you found that talking about your experiences at the incident have helped you in any ways? YES/NO
If YES, please state how it has helped:-

.....

.....

12) Did you have, or are you still having any emotional problems because of your experiences at the incident? YES/NO

If YES please amplify:-

.....

.....

.....

13) Do you still have memory 'flashbacks' of the incident? YES/NO

If YES please state when these seem to occur and if they help you or bother you in any way:- .....

.....

.....

.....

14) Have you had any other experiences that you can attribute to your attendence at the incident which you think may be useful to know about:- .....

.....

.....

.....

15) Can you describe, briefly, your emotional state, i.e. how you felt, at the time and immediately after the incident:-.....

.....

.....

.....

16) Can you describe how you feel right now about the incident and the handling of bodies at the incident:-

.....

.....

.....

17) If you feel that there are some points about yourself with regards to your personal involvement in handling bodies or attendance at the incident, please give details below:-

.....

.....

.....

.....

FIRE SERVICE JOB REACTION QUESTIONNAIRE

Instructions

There are many situations that happen during everyday Fire Service work which Firemen react to in different ways. For example; the prospect of a new Officer in Charge of a Station makes some Firemen tense and nervous, whereas others become determined and aggresive, Similarly, the thought of a new challenge can make some Firemen apprehensive, but others excited and challenged.

Immediately below are a variety of different REACTIONS that Firemen can have to these sorts of situations. As you can see, each varies from 5 - A VERY STRONG REACTION to 1 - NOT MUCH OF A REACTION.

On the page opposite you will see a list of 20 different job situations which can happen at work. Please will you do two things :-
FIRSTLY - Read down the list of the situations and tick Box 'A' (on the left hand side of the page) against all those situations that you have ACTUALLY EXPERIENCED.
SECONDLY - Rate your REACTIONS to ALL of the situations (whether you have experienced them personally or not) in each box at the right of the page.

I suggest you work down each column so rate changes in heart beat for ALL the situations, then rate feelings of competency for ALL the situations and so on. You should have a number between 1 and 5 in each box.

REACTIONS

1.	My Heart seems to beat faster.	5	4	3	2	1	There's no change in my heartbeat.
2.	I feel inadequate.	5	4	3	2	1	I feel competent.
3.	I want to get out of the situation.	5	4	3	2	1	I enjoy being in the situation.
4.	I get annoyed.	5	4	3	2	1	I feel friendly.
5.	I feel very nervous.	5	4	3	2	1	I feel quite calm.
6.	I get a queasy feeling in my stomach.	5	4	3	2	1	My stomach feels perfectly settled.
7.	I feel very tense.	5	4	3	2	1	I feel quite relaxed.
8.	My emotions interfere with what I'm doing.	5	4	3	2	1	I keep control and think clearly.

BOX A	SITUATION	REACTION 1	2	3	4	5	6	7	8
	Coming on Duty.								
	Arriving at home after a busy shift.								
	Having your performance watched by a Senior Officer.								
	Being interviewed by a Senior Officer.								
	Making a mistake on drill in front of colleagues.								
	Participating in drills.								
	Participating in an exercise.								
	The bells 'going down' on station.								
	Travelling as a crew member to an incident.								
	Arrival at a fire								
	Arrival at a special service call, 'persons trapped'.								
	Arrival at a 'persons reported' fire.								
	Getting to work at an incident.								
	Colleagues pointing out a mistake you've made at an incident.								
	Being involved in clearing up and damping down operations.								
	Thinking about an incident you have just been to.								
	Talking amongst your colleagues back at station about an incident you have just been to.								
	Talking amongst your colleagues about incidents you have been to in the past.								
	Being unsure of how a piece of equipment works.								
	Being in a dangerous situation.								
	Participating in watch 'pranks'.								
	Standing around talking on the fireground immediately after the incident about your expereiences at that incident.								
	Having to perfonn repititious drills.								

YOUR BEHAVIOUR

This questionnaire is concerned with some aspects of your general behaviour.

Each of us belongs somewhere along the scale between each pair of contrasting statements.

Please read each pair of statements, then circle the ONE number which you feel best represents your behaviour. There are no right or wrong answers so please do not think too long about each item,

for example:

I am always happy	5	4	3	2	1	0	1	2	3	4	5	I am seldom happy

If you feel that you are 'always happy' then circle the '6' nearest to that statement:

I am always happy	(5)	4	3	2	1	0	1	2	3	4	5	I am seldom happy

I am always on time	5	4	3	2	1	0	1	2	3	4	5	I am never on time
I am not competitive	5	4	3	2	1	0	1	2	3	4	5	I am competitive
I anticipate what others are going to say	5	4	3	2	1	0	1	2	3	4	5	I am a good listener
I always feel rushed	5	4	3	2	1	0	1	2	3	4	5	I never feel rushed
I can wait patiently	5	4	3	2	1	0	1	2	3	4	5	I am impatient whilst waiting
I go all out in the things I do	5	4	3	2	1	0	1	2	3	4	5	I am casual about the things I do
I take things one at a time	5	4	3	2	1	0	1	2	3	4	5	I try to do many things at once
I am emphatic in speech (raise voice, stress certain words)	5	4	3	2	1	0	1	2	3	4	5	I am a slow deliberate talker
I care about what others may think of me	5	4	3	2	1	0	1	2	3	4	5	I do not care about what others may think of me
I do things fast	5	4	3	2	1	0	1	2	3	4	5	I do things slow
I am easy going	5	4	3	2	1	0	1	2	3	4	5	I am hard driving
I hide my feelings	5	4	3	2	1	0	1	2	3	4	5	I express my feelings
I have many interests (outside my job)	5	4	3	2	1	0	1	2	3	4	5	I have few interests (outside my job)
I am not ambitious	5	4	3	2	1	0	1	2	3	4	5	I am ambitious

APPENDIX 8

LOCUS OF CONTROL QUESTIONNAIRE

Please circle either 'a' or 'b' in each numbered pair as the statements which you accept more strongly. Please answer all questions.

1. a. Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. Peoples misfortunes result from the mistakes they make.
3. a. One of the major reasons we have wars is because people dont take enough interest in politics.
   b. There will always be wars no matter how hard people try to prevent them.
4. a. In the long run people get the respect they deserve in this world.
   b. Unfortunately, an individuals worth often passes unrecognised no matter how hard he tries.
5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students dont realise the extent their marks are influenced by accidental happenings.
6. a. Without the right luck one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.
7. a. No matter how hard you try some people just dont like you.
   b. People who cant get others to like them dont understand how to get along with others.
8. a. Heredity plays the major role in determining ones personality.
   b. It is ones experiences in life which determine what they are like.
9. a. I have often found that what is going to happen will happen.
   b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair exam.
    b Many times exam questions tend to be so unrelated to course work that studying is really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.
12. a. The man in the street can have an influence in government decisions.
    b. This world is run by the few people in power, and there is not much the man in the street can do about it.
13. a. When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
14. a. There are certain people who are just no good.
    b. There is some good in everybody.
15. a. In my case getting what I want has little or nothing to do with luck.
    b. Many times we might as well just decide what to do by flipping a coin.
16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first
    b. Getting to do the right thing depends on ability, luck has little or nothing to do with it.
17. a. As far as world affairs are concerned, most of us are victims of forces we can neither understand, nor control.
    b. By taking an active part in political and social affairs the people can control world events.
18. a. Most people dont realise the extent to which their lives are controlled by accidental happenings.
    b. There is really no such thing as 'luck'.
19. a. One should always be willing to admit mistakes.
    b. It is usually best to cover up ones mistakes.
20. a. It is hard to know whether or not a person really likes you.
    b. How many friends you have depends on how nice a person you are.
21. a. In the long run the bad things that happen to us are balance by the good.
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
22. a. With enough effort, we can wipe out political corruption.
    b. It is difficult for people to have much control over the things politicians do in office.
23. a. Sometimes I cant understand how teachers arrive at the marks they give.
    b. There is a direct connection between how hard I study and the marks I get.

24. a. A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.
25. a. Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.
26. a. People are lonely because they dont try to be friendly.
    b. Theres not much use in trying too hard to please people, if they like you, they like you.
27. a. There is too much emphasis in athletics in secondary school.
    b. Team sports are an excellent way to build character.
28. a. What happens to me is my own doing.
    b. Sometimes I feel that I dont have enough control over the direction my life is taking.
29. a. Most of the time I cant understand why politicians behave the way they do.
    b. In the long run, the people are responsible for bad government on a national as well as on a local level.

NAME.....

DATE.....

GENERAL HEALTH QUESTIONNAIRE

Please read this carefully :-

I would like to know if you have had any medical complaints and how your health has generally been since you joined the fire service. Please answer ALL the questions below simply underlining the answer which you think most nearly applies to you.

It is important that you answer ALL the questions. Remember, this information will be treated purely for research and will be kept by me in the strictest confidence.

Thank you for your cooperation.

1.	been feeling perfectly well and in good health?	Better than usual	Same as usual	Worse than usual	Much worse than usual
2.	been feeling in need of a good tonic?	Not at all	No more than usual	Rather more than usual	Much more than usual
3.	been feeling run down and out of sorts?	Not at all	No more than usual	Rather more than usual	Much more than usual
4.	felt that you are ill?	Not at all	No more than usual	Rather more than usual	Much more than usual
5.	been getting any pains in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
6.	been getting a feeling of tightness or pressure in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
9.	been having hot or cold spells?	Not at all	No more than usual	Rather more than usual	Much more than usual
14.	lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
18.	had difficulty in staying asleep once you are off?	Not at all	No more than usual	Rather more than usual	Much more than usual

21	been managing to keep yourself busy and occupied?	More so than usual	Same as usual	Rather less than usual	Much less than usual
22.	been taking longer over the things you do?	Quicker than usual	Same as usual	Longer than usual	Much longer than usual
28.	felt on the whole you were doing things well?	Better than usual	About the same	Less well than usual	Much less well
30.	been satisfied with the way you've carried out your task?	More satisfied	About same as usual	Less satisfied than usual	Much less satisfied
35	felt that you are playing a useful part in things?	More so than usual	Same as usual	Less useful than usual	Much less than usual
36.	felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
39.	felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
42.	been able to enjoy your normal day-to-day activities?	More so than usual	Same as usual	Less so than usual	Much less than usual
44.	been getting edgy and bad-tempered?	Not at all	No more than usual	Rather more than usual	Much more than usual
45.	been getting scared or panicky for no good reason?	Not at all	No more than usual	Rather more than usual	Much more than usual
47.	found everything getting on top of you?	Not at all	No more than usual	Rather more than usual	Much more than usual
51.	been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
52.	felt that life is entirely hopeless?	Not at all	No more than usual	Rather more than usual	Much more than usual

55.	been feeling nervous and strung-up all the time?	Not at all	No more than usual	Rather more than usual	Much more than usual
56.	felt that life isn't worth living?	Not at all	No more than usual	Rather more than usual	Much more than usual
57.	thought of the possibility that you might make away with yourself?	Definitely not	I don't think so	Has crossed my mind	Definitely have
58.	found at times you couldn't do anything because your nerves were too bad?	Not at all	No more than usual	Rather more than usual	Much more than usual
59.	found yourself wishing you were dead and away from it all?	Not at all	No more than usual	Rather more than usual	Much more than usual
60.	found that the idea of taking your own life kept coming into your mind?	Definitely not	I don't think so	Has crossed my mind	Definitely has

Now that you have completed the questionnaire please write your name below and place the form in an envelope and send it back to the Coordinator at Training School. Thank you.

Length of Service _____

APPENDIX 10

Glossary of Fire Service Terms

Attendance.

Any call or incident that is attended by a fire engine.

Appliance.

A general term used to describe any fire engine.

Breathing Apparatus.(B.A.)

A self contained compressed air breathing set designed to provide a breathable atmosphere for the wearer who will need to work in an irrespirable atmosphere. Fire service B.A. sets are normally designed to last for approximately 30-45 minutes.

Crew.

This refers to the group of firefighters who are riding a fire appliance. This number varies according to the type of appliance and the number of firefighters on duty on the watch at any particular fire station. For pumping appliances the maximum is 6 and the minimum is 4.

Drills.

These are the daily activities engaged in by firefighters to develop and repeatedly practice their skills the use of their equipment in varied ways and situations.

Foam Tender.

A special appliance which is designed to carry foam concentrate and foam making equipment to deal with special types of fires that can only be extinguished using foam.

Fire Appliance.

Same as for 'Appliance'.

Firefighting Gear.

This term is used to describe the protective tunic, overtrousers,boots and helmet that a firefighter wears when attending any incident. This gear is normally kept on the appliance that the firefighter is designated to ride whilst on duty and is donned en-route to an incident.

First Attendance.

The term used to describe the fire engines which will arrive at an incident first. They normally form part of the pre-determined attendance.

Incident.

Any occurrence where an attendance is made by the fire brigade. It can be either an emergency or otherwise.

Job.

Same as for 'incident'.

Persons Reported.

An incident where persons have been reported to be trapped and will require to be rescued.

Pre-determined Attendances.

Term used to describe the set number of fire engines that are sent on the initial receipt of a call. Also known as PDA's for short.

Pumping Appliances.

Fire engines that have a fixed or integral pump driven by the road engine.

Riders.

Term used for firefighters who 'ride' the fire engines.

Rider Officer.

Term used to describe officer ranks who 'ride' the fire engines. Normally they are in charge of the fire engine and are designated as an 'officer in charge'.

Shout.

Term used by firefighters to describe an emergency call.

Shift.

One part of a tour of duty.

Station Area.

The geographic area surrounding a fire station in which the station is responsible for the fire service administration within that area. It will also be the main turnout area for that station to respond to calls as part of the first attendance.

Tour of Duty.

Term used to describe a complete set of working shifts ie. two day shifts and two night shifts.

Turnout.

The response to a call where fire engines turnout of the station. Sometimes used to describe any call whether the response is physically from the station or not.